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PRESIDENTIAL ADDRESS

Ladies and Gentlemen,—

My first duty is to thank you for the honor of presiding at this, the fifty-second meeting of the Canadian Medical Association. I am not vain enough to even hope to add lustre to the chair—a chair illuminated by so many of the brightest and best of the sons of Canada. I shall be content if I allow it not to suffer any eclipse during my incumbency.

Upon a president rests many burdens, but our efficient committee of arrangements has relieved me of most of them. There is one they could not shoulder, and that is the presidential address. For better or worse, the members of that committee stood aloof from what they considered to be sacred ground. So here I stand before you untrammelled and burdened with the annual message.

Among the many subjects that appealed to me for my address was medical education in the Maritime Provinces, but I dismissed it as being too sectional. Besides, I am no historian, and I would not risk the reputation of our graduates, scattered from Corea to Cape Sable, by a lame effort of mine to describe the history of their Alma Mater, the Halifax Medical College.

I, therefore, decided to choose a subject of more universal interest and application—somewhat like the sermon of one of Wesley's lay preachers of which he was very fond. It was based upon a text from St. James; "the tongue is an unruly member," and he always began

his sermon: "Brethren, the subject of my discourse to-day is in everyone's mouth."

Universality of application will not be found wanting in my choice of subjects, viz., "Professional Tangents."

The subject naturally falls into two divisions: (a) Our relations or contacts with each other, and (b) our relations or contacts with the outside. The old woman was not very far wrong when she divided humanity into three classes—men, women and doctors—so we have relations to each of these, but specially to one another.

Before taking up these relations in detail, I may be pardoned, in view of what I have hereafter to say about medical education, to take a passing glance at the Halifax Medical College. To that institution I gave the best part of thirty years. Its governors, senate and teachers were all medical men. We developed an enthusiasm and solidarity which is rare to find in more cosmopolitan institutions. We gave first place to anatomy, the institutes of medicine or physiology and clinical instruction; second or third place only to handmaids. The amphitheatre and lecture room were used, but not emphasized. Give me a student well drilled in anatomy, with an intelligent knowledge of physiology; whose powers of observation and analysis have been well trained at the bedside, and I will wager upon his ability to hold his own against all comers.

But the Carnegie philanthropists came along to spy out the land. They saw the buildings; that was enough, for we had no sky-scrappers. They asked not to see the men, nor to find out their methods of teaching. They gave an evil

*Delivered before the Canadian Medical Association at its fifty-second annual meeting, Halifax, July, 1921.

report, and to the credit of the profession in Halifax; its teachers in the Halifax Medical College disbanded, in order to give medical education in the Maritime Provinces the benefit of the tutelage, oversight and imprimatur of an endowed university. Nor can we in Canada be over-grateful for the victory of kinship over nationalism, which made such liberal endowments possible.

We owe much to our neighbors, but I must hurry on or my prologue will be like the postscript of the Irishman's letter, twice the length of his communication. So I take up our mutual contacts. These may be summed up in two words: gentlemanly conduct. But here we will do well to take a lesson from the Book. The whole moral law can be summed up in one word, love; but when the angel of Jehovah took Israel under his tutelage, he elaborated that word into ten specific and all-comprehensive Commandments.

So with the words gentlemanly conduct. They are not enough. We want something more definite. Dr. Percival of England over a century ago felt they were not enough when his son left home to practice his profession. With noble solicitude, he wrote a letter, or a series of letters, to guide him in his relations to his brethren, his patients and the public. They were published in England in 1803. They were adopted with very few minor alterations as the American code of Ethics in 1847 and by this association, some years afterwards. Is that enough? If so, let me ask all who have seen this code to hold up their hands.

I asked this at a medical meeting not long ago, and not half a dozen responded. There is something wrong—something wanted. Again to the Book. They were commanded to write His law in prominent places. What prominence have we given to our Code of Ethics? I hold in my hand the Code of Ethics of the Canadian Medical Association. You see how small it is—paper-covered, too, like so much advertising stuff that comes to load our desks. Good kindling—that is all, and that was the fate of one copy sent to me by our general secretary on request. Before then I never saw one, never knew, in fact, that we had one.

I would suggest, therefore, that this association take steps to get out a copy like this American quarto, which is respectably bound with Dr. Flint's commentaries. I would go one better. I would make it an octavo, no matter how thin, and I would have a copy given to graduates when they register in any and all of our Provinces. I also suggest that in order to make the Code duly prominent, every graduate, when registering, should be made to ascribe dominance to our Code, by subscribing

his or her name in promise of obedience thereto.

So much for our relations to one another. Our individual contracts. There is another close by: our relation to those who come after us, and, therefore, to medical education. Some one says leave that to the Universities. But our laws do not leave it to the Universities. They saddle us with that responsibility, because Universities are governed by men who cannot see things medically. Through our Provincial Boards we have to prescribe the course of instruction and sit as assessors or associate examiners at University examinations. These two duties imply a third: that of keeping track of the methods adopted by Universities to fulfil our requirements. I am, therefore, strictly correct in bringing this phase of our objective under review.

As examiner for Dalhousie, I led a graduate of one of our best Universities to the bedside of a patient with a typical Hunterian sore. What do you see? "A sore." Very well, what kind of a sore? "A hard sore." What kind of a hard sore? He was stuck. Trying to help him out! Did you ever see a desquamating papule? "No." Ever see Richards parchment? "Never." A Hunterian chancre? "Never heard of it." That is strange, I remarked, unless you come from a college where all the people are good. He answered, "We always trusted to laboratory findings in these cases." And no doubt they did, but evidently to the exclusion of that close, keen and systematic clinical instruction and observation, without which all medical education is a lopsided farce, for our graduates cannot carry labs. on their backs through the length and breadth of Canada.

I see in this McGill endowment booklet a cut which is very suggestive. It shows a long table set with microscopes, into which an equal number of students are peering. Beneath the cut are the words: "Examining Blood; Making Doctors." The cut may be a figure of speech; putting the part for the whole, with which I find no fault. But it may be another phase of the same figure of speech: putting the instrument for the agent, with a view to emphasize the superiority of laboratories over clinical teachers in medical training. This is the modern trend, and a great advance in turning out bedside incompetents.

I hold in my hand a chemistry exam. paper set by another college for second year students in medicine. It is the kind of paper one would expect for students making chemistry a life study for the different arts, but there is as much heat in a moonbeam as there is of practical value in this paper for the medical prac-

titioner. There is not one question in the whole lot bearing upon the metabolism of the human body.

The same thing is true of the paper in physics. I could not answer one question in either, and I am not ashamed to confess it. In fact, I am glad to have it known, for it is absolutely certain that if I could answer these questions I should have to be classed as an ignorant clinician. No finite being can be a universal specialist. After such a confession, which I know is representative, I can fancy a student well justified in taking up the words of the Master: "Woe unto you Scribes and Pharisees; hypocrites, ye bind heavy burdens and grievous to be borne, upon men's shoulders, and ye yourselves do not touch them with your little fingers." Surely here there is a miscarriage of intention. It was never the intention to make two non-medical subjects; subjects at least so non-medical that we shine in forgetting all but their elements, the heaviest by far in any one year of our prescribed course of medical education.

In this connection, too, let it not be forgotten that specializing much in one subject unfits a person for proficiency in another. A watchmaker can never be a ploughman, and vice versa. So with prolonged laboratory training. It unfits the student for efficient work at the bedside. He can see nothing outside of a test tube or a microscope, and it will take a long time to break him into seeing clinically. At least, he has missed one or more years' chance of doing so—a loss irremediable in his short course of medical education.

And now, when the laboratory-logged graduate—the universal specialist—obtains his degree, and goes out into practice, how long does it take him to find out that what matters for himself and his patients is clinical knowledge, and to curse the academic alphabets that robbed him of professional experience? How many of them will keep fully equipped laboratories in their offices? How many can spare the time to man them, and, lastly, how many will trust to their own findings when reliable specialists are within reach? If there be not one in a thousand, and there is not, what is the sense in wasting time, dissipating energy and unfitting students for clinical observation, by blindbowing to the present-day trend in medical education?

But I would not be misunderstood. Let our Universities by all means cover the whole field of medical science. Yet I would not add to that the ability to weigh the moon in physics, nor the discerning of the results of millenniums of sun-ray activity in organic chemistry. We cannot in our short lives cover the whole field of science. We are compelled to special-

ize, even in medicine. How criminal, then, to take the medical student's time and devote it to specialisms, which are of no earthly good in training him to recognize and heal disease? Let the course be graded so as to equip the one who determines to live by his test-tube, on the one hand, and the bedside observer and healer, on the other. Let our Universities realize that there is no other place in the world like the bedside, with a well qualified teacher—no Euclid, no Homer equal to it in developing keen observation, deep analysis, well balanced judgment, and sound, saving common sense. Let them also realize that what fits a student for such training is a practical knowledge of anatomy, and a sound technical knowledge of physiology. I use the word technical here, because a practical knowledge is the life-work of specialists, and then they do not know it all. These, and not the aerial stunts in flying after what may be characterized truthfully, as non-tangent specialisms, are what our students need to equip them for receiving clinical instruction. I have attended the clinics of many noted men in America and England (Osler included) and I never had to recall my chemistry, much less my physics, in order to drink in all that they said.

It never faded from my mind and I transmit the impression to the profession as my last legacy—that caused by Princess Louise's physician, Dr. Anderson, when he went through the wards of the Montreal General Hospital. Being pressed for time, he walked rapidly ahead, led by our clinical teacher, Dr. Ross. "This patient has pneumonia, this one heart disease, this one Bright's, this one consumption, this one is taking belladonna," and so on through the whole ward. With scarcely an exception he was correct. We were overwhelmed with astonishment and admiration. How did he acquire his diagnostic acumen? Not, I assure you, by trying to crowd half a dozen specialties into one short life. What, then, of trying to crowd them into five years of medical training?

So much for our relations to those who come after us. Some head, or someone with a head bursting by what he does not know of medicine may rail at us for impertinence or non-conformity, but our dear mothers—our sweet Alma Maters—will not be affronted when their matured children warn them against the folly and danger of gormandizing over too many strange dishes.

I will now very briefly take up our contacts with things outside. I begin with our schools, since we are guardians of the public health. In these we see overmuch of the hodge-podge cramming, which I have been inveighing against in recent medical education. Somewhere I have seen a cartoon representing a

thin, weakly child going to school, with a motor lorry coming behind loaded with her books. They represented the "ologies."

Surely comment is unnecessary. Let us spread our protecting wings over the helpless. Education is not a cramming process. It is a drawing out of things latent, and should pay strict regard to the stages of development. Imitation of sound-language. Imitation of form-writing. The cultivation of reflection-arithmetic. These were well represented by our forefathers' three R's: "Reading, 'riting, 'rithmetic"; and there is more common sense behind them than we now find in the loaded curriculum of our common schools.

I pass on to our relations to the bone-dry movement. In what I am going to say on this subject I will no doubt tread upon very tender corns. Let me offer these sufferers a protective cushion, by assuring them that I do not value temperance less because I deprecate intemperance more. Let me also assure them that I have the utmost respect for the economy of God. Where His economy clashes with that of man, I do not hesitate in my choice. Now in His economy, as revealed in the Book, two kinds of nourishing drinks for the use of man are often joined together; one from the vegetable kingdom, wine; the other from the animal kingdom, milk. They are equally honored in being chosen to figuratively represent the boundless beneficence of God. "Come buy wine and milk without money and without price."

But present-day savants proudly proclaim that the revealed economy of God is a "busted" mixture of good, bad and indifferent. Is it? Take milk as a test. It would speedily rot like meat were it not for the preservative chemistry and chemists of God. He who made the secretion of milk possible made the preservation of its vitalizing properties easy. How? By creating the lactic acid bacillus—the bacillus, Bulgaricus, if you like. God's preserving process does not destroy the vitalizing qualities, the vitamines of milk. In fact, it often enhances their value, as proven by the long lives of the Bulgarians.

So with the juice of the grape, the acme of all vegetable drinks. Its vitalizing properties are not lost, when another of God's chemists turns its sugar into alcohol to preserve its vitalizing properties. We preserve the medicinal qualities of plants by alcoholic tinctures. God was away ahead of us. He conserved the vitalizing properties of the fruit of the vine by creating the agents for its preservation.

Accordingly, a large proportion of the human race use it, and always did use it, without detriment to health or morals, on the one hand, and with divinely beneficent results on the

other. But it is subject to abuse. So are all the best things of God. Do we therefore banish them? Do we banish food because there are gluttons, or women because there are incontinent? Do we stop drilling of soldiers because many of them succumb? Such is not the testing economy of God, for when He tabernacled among men he came eating and drinking subject to all temptations, and laid himself open to the taunt of being a wine bibber and a glutton, flung at Him by the Cephalopods of his day.

Now they are having their own way with His word, as they had before with its Author, and that through the civil power. But St. John saw a strange vision: A harlot riding a beast with seven heads and ten horns. The harlot represents a church, which has left the Gospel of Grace to which it is married, and has gone a whoring after law and force; and the beast with the horns represents the regnant civil powers. He says these shall hate the harlot and shall make her desolate, and naked and shall eat her flesh and burn her with fire; because God hath put it into their hearts to restore to her double. Let Christianity, therefore, beware how it allies itself with coercion to enforce a law that is not of God, and that is not, therefore, written upon the hearts of men. The effort to do so by fines, imprisonment and shooting, rankles, inflames and infuriates. It may take years, but sooner or later, for this prophecy, like all prophecy, must be fulfilled, the horns will turn and rip the rider. The exorcised devil will return with seven other devils worse than itself, and the latter state will be worse than the first.

"Tis the sunset of life gives me scriptural lore,

And coming events cast their shadows before."

What means the rumblings of restlessness and the standing aside from all authority we see in the world to-day? What means the motto, "No God, no church," in Soviet Russia now? What means it, but that our blind coercive legislation is fast piling up tinder for the predicted conflagration? I am not arguing for the return of the bar-room, with its distilled liquors, but I am pleading for the God-given right of even distribution for wine and milk. What God hath joined together let no man put asunder.

But they put up the plea of unfermented wine. This is the last refuge of the ignorant, or, if not that, then of scoundrels. When it can be proven that the ever-present fermentation spore did not cleave to the feet of those who trod the wine presses; or that these spores all died when the rendered juice was stored up in goat skins; then, but not till then, can we attribute knowledge, honor and integrity to

those who put up the plea of unfermented wine in Bible days and lands where they have and had but one vintage a year.

I now come, nautically speaking, to the last leg of my course; our attitude to the occult. Here we should realize our limitations. There is a gulf fixed between the physical and the spiritual which nothing physical can bridge. Neither microscope nor telescope, nor any other inventive adaptation of material law can reveal the mind and purpose of God, nor pierce beyond the tomb. This has long been accepted as axiomatic in human experience, for very early in history reliance for such information was placed in mediums, speaking it was supposed under the influence of beings from another sphere. I was told by a medical student of ours who had gone through the Maori war that the Maori were firm believers in these messages. So, of all the heathen nations of antiquity, and so of them to-day.

Now in view of the recrudescence of this belief in our day, the question is pertinent, what good did it do them then and what now? Did it minister to the people's health, enlighten their minds or improve their morals? Its deleterious effect upon the health of its devotees was ably shown at our last meeting by Dr. Wm. House of Portland, Oregon. As to its influence over mind and morals, it is reasonable to infer that it can be no better here than where it has been in vogue for millenniums. Nor can our modern mediums ever hope to surpass the occult powers of the Witch of Endor, or the Maori of New Zealand. To what then is the world indebted for raising it from the dark and debasing level into which it sank under the influence of mediums. He is blind who would not attribute it to the interpositions of God, of which the scriptures are a prolonged record. Who can deny that conformity to that record would bring blessedness to individuals, communities and nations—in short, to the world! Why then should anyone, with the least ray of reflection, slap Beneficence in the face, by taking up with that which has been

found wanting, after prolonged trial; and which for the good of the race the Omniscient One has so often warned against, forbidden and denounced?

But Conan Doyle is fathering a new revelation. There is nothing to help him out like disbelieving, or discrediting, and discarding or disobeying the old. The radical critics are guilty of the first, for they deny the authenticity of Scripture; and the Bone Drys are guilty of the second, for they prohibit that which the Book allows and recommends. Conan Doyle tells us he began life as a pronounced materialist, discrediting the old revelation because founded upon what he considered impossible super-natural phenomena. He now comes forward with a new revelation based upon phenomena similar to those upon which he previously discarded the old. But there is a vast difference between the deliverances of wizards that peep and mutter—between those of mediums in a trance, or writers super-controlled, and the miraculously accredited messages and messengers of Jehovah. When He spoke the mountain burned with fire and quaked; when His prophets spoke, for they were his mediums and supercontrolled writers, He left no doubt as to the source of their inspiration. They were, therefore, able to cry with Divine authority: "Hear, O Heaven, and give ear, O earth, for Jehovah hath spoken." We should, therefore, be wanting in our Therapeusis if we did not warn against spurious imitations of the old revelation—imitations which for ages wrought misery in the world and many a woe.

Ladies and Gentlemen, there can be no substitute for the old revelation; for He who spoke as never man spoke said:—He who was sent from God said: He, who was in the bosom of the Father before the world was, said: He who conquered death, and ascended up on high, far above all Principalities and Powers said: "They have Moses and the Prophets; if they do not hear them neither will they be persuaded if one rose from the dead."

THE DOCTRINE OF THE PREPARED SOIL: A NEGLECTED FACTOR IN SURGICAL INFECTIONS*

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THE introduction of the germ theory of disease may be said to have laid the foundation of modern medicine and to be the whole basis of our views in regard to surgical infections. The practical application of this doctrine to wounds and to the practice of surgery by Lord Lister is properly regarded as the beginning of modern surgery. From this developed aseptic surgery, opening the whole field of exploratory operations to the properly equipped surgeon. With this development went the growth of the laboratory as an essential agent in enabling us to fit treatment to disease. To-day we are exceedingly dependent upon the results of laboratory investigations, and one might perhaps refer to the present era as the laboratory period. On the other hand, it sometimes occurs to me to think that we at times lose our sense of proportion and become altogether too dependent upon our laboratory associates and at times rely too implicitly upon their results. Certainly the modern medical student often fails to recognize the proper relation of laboratory investigations to the care of patients to such an extent that they become not his assistant, but his master. It is not rare to find in the active, devoted young hospital surgeon a state of mind in which he almost believes that bacteria are the cause of infection. He appears to forget that infection is a result, that bacteria in and of themselves can do nothing except in contact with living tissue and then, often, only under highly special conditions. He forgets that it takes two to make a fight; that there are two essential parties to an infection. Perhaps he may be trusted to learn, as time goes on, that infection is nothing more nor less than the reaction of an individual to a particular kind of an insult and that with two people equally exposed to infection one may acquire it and one may not.

Much as we know about the etiology of dis-

ease we are still much in the dark concerning the conditions of the body antecedent or predisposing to infection. We use the phrase susceptibility with a very vague conception of what constitutes susceptibility and we talk rather gravely about immunity while there is still much in this field of which we are ignorant. Of the bactericidal power of the blood and tissue fluids we know something, but not all. We know something of the ability of cells to destroy bacteria, but of the precise conditions which influence their activity there is much that we do not know. Here is an immense field still open for further investigation and here, beyond question, great reputations will be made.

But it is not to this aspect of infection that I desire to-day particularly to call your attention. It is rather to certain other conditions favorable to infection that I wish to invite your attention. Modern surgery is dependent upon our ability to avoid infections which might perhaps be called extraneous. I do not wish to confine this term extraneous to the actual introduction of bacteria into the wound, though they are, of course, an important factor. Rather do I wish to include all those conditions as the result of which wound infection of some degree results. I need not take your time to point out that, though the whole structure of modern surgery is erected upon our ability to avoid infections which do not exist before operation, it is notorious that our success is incomplete. No one of us goes through a busy year without having some patient—even many—whose convalescence is lengthened, whose life is jeopardized and in whom the result of our efforts is less perfect than it might have been, because we did not avoid infection. A certain, though perhaps small, number of the deaths chargeable to surgery are the result of our failure to avoid infection. This appears to me to be one of the weakest points in the armour of the surgeon, and I am not sure that our enthusiastic devotion to the study of bacteriology and our almost slavish adher-

Address in Surgery delivered before the Canadian Medical Association, Halifax, July, 1921.

ence to the view that bacteria are the cause of infection has not to some extent drawn our attention away from other factors which are of almost equal importance. Most of you will be able to call to mind the situation which arises in a hospital when in a given period of time there is more wound infection than is the average for that locality and suspicion arises that all is not well. At once we begin to suspect that the sponges and such gear concerned with the operation have not been properly sterilized or that the ligatures or sutures have been carelessly prepared; or failing that, that our assistants or our nurses have failed of their full devotion to the theory of aseptic surgery. Even perchance we begin to investigate the very air we breathe as the source of this noxious happening which has shaken our confidence in our ability to avoid infection. Here we see in its purest form the operation of the Doctrine of the Goat showing our eternal desire to pin on to something or somebody the errors of omission or commission which we believe to have brought about our downfall. As a rule, in my judgment, the surgeon is the chief source of these wound infections, and it must be shown that this be not true before we try to lay the blame at the door of others. I do not at all intend to suggest that bacteria are introduced into the wound by the surgeon. It is precisely because I do not believe that the essential factor here is the introduction of bacteria that I take your time at all in discussing this question. The responsibility of the surgeon appears to me to include not only his liability to introduce bacteria, but also his failure to protect the patient from those conditions which make infection probable. These conditions are manifold and I like to group them under the head of The Prepared Soil. Now these conditions making for infection may be either general or local.

General Conditions

Under the general conditions we should group those which we may refer to, perhaps rather vaguely, under the phrase, lowered resistance.

Fear—Among these I would put in a high position fear. We all of us are familiar with the fact that the condition of the mind has an important effect on the condition of the body, but we fail sometimes I think to apply this doctrine where it would do most good. Many times I have seen patients whose convalescence seemed to me clearly lengthened, whose wounds healed sluggishly or acquired infection, largely because from the outset they were in mortal terror of the result. The reverse of

the picture is perhaps more striking. We have, all of us, seen patients whose optimism and fearlessness were such that they withstood fearful surgical insults without shaking either their equanimity or their healing power. Now fear, particularly in connection with surgery, is not a thing which can be wholly avoided, yet it may be much minimized, and, as I think, to great advantage. Crile has clearly shown that the minimizing of fear in operations upon the thyroid gland under toxic conditions does much to lower mortality. While it is undoubtedly true that fear is an unusually important factor in disease of the thyroid gland, it is none the less an important factor always in surgery, and I feel sure that we shall do well to guard our patients against fear and to surround them by the largest possible amount of protection in order to minimize its affect upon their reaction to surgery.

Starvation—At a somewhat earlier time I should have placed starvation high in the list of those conditions which predispose to infection. Undoubtedly a generation ago, or in the earlier days of abdominal surgery, we deprived our patients of food to an unwise extent and thereby lowered their resistance. I am not sure that we have even yet reached the limit of our willingness to continue patients upon an ordinary diet up to the last moment. Particularly is this important in the old, the feeble and the young. At both ends of the scale of life we meet conditions of diminished resistance to insult, and we must be upon our guard against depriving these patients of their ordinary income of sustenance.

Dehydration—Perhaps under starvation, but not always thought of in that light, should be considered dehydration, the withdrawal of water before operative procedures. Of late years more and more the evidence has been forthcoming that the withdrawal of water is gravely dangerous to many patients under many conditions. I believe that there can be no doubt that the habit of most of us a generation ago of practically withdrawing liquids entirely during the twelve hours previous to operation and very largely withholding them during the same period after operation tended to invite lowered resistance and consequent infection. I entirely believe that the withdrawal of water should be reduced to a minimum; that if patients have suffered from any condition in which their body fluids have been reduced that this reduction should be made good before operation and maintained afterwards. None of us, I take it, withhold water before operation to the extent that we did years ago, but I am not sure that we realize the danger of dehydration quite enough, and doubt if the in-

troduction of fluid both by rectum and under the skin as the antecedent to operations in critical cases is practiced as much as its importance would justify. In the same way I doubt if we pay enough attention to fluid intake after operation, especially in patients in whom liquids cannot properly be given by mouth in sufficient quantities. To sum up what I have to say in regard to starvation and dehydration, I believe we should use every endeavor to maintain patients on a full diet to the last safe moment, and to be sure that their body fluids are at least up to normal before operation and kept to normal after operation.

Anaesthesia—Another important general condition tending to lower resistance is anaesthesia. The last ten years have seen an enormous improvement in the administration of anaesthetics. It is now widely regarded as a rather special business and the days when we entrusted it to the least competent person are happily of the past. Nevertheless, I doubt whether we sufficiently recognize that the proper choice and skillful administration of the anaesthetic is an important factor in the healing of our wounds. For instance, the selection of ether for no reason other than that it is the only anaesthetic sufficiently fool-proof to be within the safety zone of the unskilled anaesthetist may well result in irritation of the respiratory passages with coughing, producing pain and bringing much additional strain upon the sutures of the abdominal wound. Had this patient been given some other anaesthetic better suited to his condition, his wound healing might well have been less stormy.

Length of Operation—And finally, under the general conditions predisposing to infection, I would put the time consumed in the operation. I fear that we are prone to forget that the time consumed in operations is taken directly from the stock of vitality of the patient. This we cannot seriously doubt because we know that particularly with ether and chloroform, undoubtedly the two most common anaesthetics, prolonged operation means a very undesirable action upon the tissues, with definite lessening of the alkali reserve and the production of at least some degree of acidosis. I believe that we should always bear in mind the requirement to get through our work in the shortest time compatible with doing everything which should be done, neither more nor less. A full adherence to this requirement would probably bar from surgery some of those people lacking in manual dexterity and who could under no conditions become dexterous operators. But though I may be judged unkind and inconsiderate, I am not sure that there are not to-day engaged in the practice of surgery many

whom the Lord never intended to be surgeons and whose talents would be better employed in some other field. I continue to believe that the minimum expenditure of time is a thing upon which the patient has a right to insist.

Local Conditions

Though I have no doubt of the importance of the general conditions just discussed as factors tending to increase liability to infection, I think it probable that the local conditions surrounding a surgical operation are of even greater importance.

Skin Preparation—In this field, as in the field just discussed, we have made a considerable advance over the conditions of a generation ago. At that time the use of a great variety of highly irritating solutions in the business of preparing the skin for operation was regarded as essential. Gradually we have abandoned one complicated method after another until to-day it appears that ordinary cleanliness is perhaps the most important factor, and that the minimum application of irritants gives the best results. I would, however, still warn against over-preparation of the skin, which, in fact, means a greater reliance upon the ability of tissues to look after themselves if not too grossly insulted.

But I come now to a group of local conditions which seem to me of commanding importance and which are, to my mind, the most important factors in the doctrine of the prepared soil.

Rough Handling of Tissues—Body tissues are undeniably delicate and die under conditions of insult. Therefore, roughness in handling, the use of dull instruments which bite and chew rather than cut, the grasping of masses of tissue in order to control bleeding, the heavy-handed drag on retractors of the absent-minded assistant turned for the moment into an interested spectator, are insults which no tissue can be expected to withstand. Yet it is all too common to see tissues handled in a manner little short of brutal. This results in death of the tissue, necrosis and the production of a medium highly favorable for the growth of bacteria. Those surgeons get the best results whose instruments are sharp, whose touch is delicate, whose eyesight is good, and whose assistants are impressed not only with the fear of God, but with the fear of tissue damage.

Haemostasis—Failure of accurate haemostasis is another factor producing conditions favorable to bacterial growth. Dry wounds heal kindly; wounds containing blood clot are notoriously prone to infection.

Mass Ligatures—Quite along the same line is

the inclusion of masses of tissue in a tight ligature where the same amount of haemostasis or better could be obtained by picking up, not a fist full of tissue, but the vessel itself. The practice of strangling a mass of tissue in order to approximate a wound and control bleeding is likewise objectionable, resulting in necrosis and favoring infection.

Our experience in the war shed a bright light upon this question of wound infection. We did not begin to handle our wounds in a satisfactory manner until we learned that the excision of damaged tissues with removal of infectious material in bulk was the key to success. Now in these wounds we do not abolish bacteria. Not only were the surrounding tissues often already invaded, but the conditions under which these operations were done did not lend themselves to first-class aseptic technique. Nevertheless it was clearly shown that the removal of devitalized tissue and grossly infected structures, particularly if done relatively early, was often followed by surprisingly kind healing. This, I think, clearly demonstrated the action of dead tissue and blood clot as a prepared soil upon which bacteria would grow, though unable to conquer the tissue when in a reasonably normal condition. The avoidance, therefore, of those conditions which make a wound favorable soil for bacterial growth becomes a factor of the first importance in avoiding infection. Surgery is still an art, and I doubt whether we value quite highly enough the art of surgery. Manual skill and dexterity are still factors of first-class importance. Asepsis and anaesthesia have tended to bring surgery to a point when speed and dexterity are something short of essential to success. In the pre-anaesthetic, and somewhat less in the pre-antiseptic days, only men of great character could be great surgeons. To-day our patients do not die and therefore we regard our operations as a success. We are apt to charge off wound infection to the carelessness of others and curse roundly our maker of sterilizers or our maker of cat gut, when we should rather look to ourselves as the real sources of the damage. Heavy hands, rough surgery, needlessly long incisions, crushed tissues, impaired circulation from too tight sutures, these and other failures of technique produce a soil prepared for infection. Given the prepared soil infection will follow in a proportion of cases quite sufficient to make up to the total of our failures, without the assumption that it is our assistants rather than ourselves who are to blame.

Now there are certain fields in which this Doctrine of the Prepared Soil is of primary importance and yet in which no surgical wound

is involved. Perhaps this is nowhere better demonstrated than in the natural history of infections of the urinary bladder. In parenthesis one might add that failure to recognize the application of this doctrine is a potent factor in the production of bladder infection. Briefly stated, the situation in regard to infections of the bladder is this: The introduction of bacteria into a normal bladder will not cause infection. This may be stated dogmatically, as there is a vast accumulation of experimental work behind it. Even moderate trauma of the bladder will not lead to infection, as shown by the fact that the use of the cystoscope and the ureter catheter even in unskilled hands is rarely followed by observable infection. In fact, did infection follow the introduction of bacteria into the bladder the whole great field of cystoscopy would be non-existent. It is quite impossible to introduce an instrument into the bladder, particularly in the male, without at the same time introducing, from the urethra, organisms. It is at least exceedingly common that the use of the cystoscope, and particularly the ureter catheter, produces slight abrasion of the mucous membrane, as witnessed by the exceeding frequency of microscopic blood in the urine collected from the ureters, and yet it is notorious that these people have no recognized infection.

What then are the conditions under which infection of the otherwise normal bladder will take place? They are the conditions resulting from overdistention due to urethral obstruction. In this way is produced pressure upon the bladder wall. The arterial supply, having behind it a positive force and a force which can be increased automatically, keeps up the nutrition of the tissue, but during this same period of pressure the venous return is gravely handicapped. Now let us assume that this bladder is suddenly emptied and the pressure released. At once active congestion of the whole bladder will ensue; if the pressure has been considerable there may be petechial haemorrhages or even gross bleeding. In the minor degrees there is oedema and soggy devitalized tissue. Here is the prepared soil on which the experimenter has been able, with considerable regularity, to produce bladder infections, and in this way, to our shame be it said, is commonly produced the so-called "catheter cystitis," which has in fact little or no relation to the catheter. We see this happening all too frequently in the conditions of so-called reflex retention of urine following surgical operations commonly in the neighborhood of the bladder. The mechanism is, I think, easy to understand, at least in theory. The machinery of normal urination depends upon the trans-

mission of stimuli through the reflex arc of the bladder neck through lumbar cord to bladder sphincter. If and when these paths of transmission are occupied more or less to the limit with the transmission of painful stimuli from recent surgical insult they are incapable of attending to the minor stimuli of bladder distention and the reflex breaks down. It has been far too much our custom in the past to postpone what we regarded as the evil day when catheterization in reflex retention must be undertaken. When faced with the over-distended bladder we are obliged to resort to the catheter, and when, owing to the prepared soil, infection followed in logical sequence we have sought refuge in the Doctrine of the Goat. We have forsooth cursed our sterilizer of catheters, our nurses, our house officers for faults which are primarily our own. Had we been willing to face the facts at the proper time, to realize that in the absence of over-distention, with its prepared soil, catheterization was an utterly harmless proceeding and, as a result of this logical sequence, had been willing to catheterize before overdistention had occurred, the so-called catheter cystitis in this group of cases would long since have become a surgical curiosity. I believe we may confidently assert that in bladders not the seat of any lesion catheterization is harmless if at no time an amount of urine in excess of a low normal, which may be put at ten ounces, is allowed to accumulate. If in this group of cases we desire to make assurance doubly sure, then we shall do what we can before operation to make the urine itself an uncongenial abiding place for organisms of the colon bacillus group. We must remember that in the infections produced by this organism the urine itself is the soil in which they multiply most freely, and that given a source within the urinary tract from which colon bacilli may enter the urine, enormous multiplication will go on with cer-

tainty. We shall therefore be well advised to administer as a routine some formaldehyde containing drug immediately preceding all surgical operations at all commonly followed by reflex retention of urine. Attention to these two points, the avoidance of distention preparing the soil, and the making of the urine a disagreeable climate for the growth of bacteria, will wipe this quasi-surgical infection from the list of our failures.

Let me now briefly recapitulate what I have consumed so much time in saying. We have, I believe, in the consideration of wound infections and allied conditions paid too much attention to the bacteria themselves and too little to the conditions which favor bacterial growth. Complete sterilization of operative fields may be judged impossible and, even though we were able to enter the body without the possibility of introducing pathogenic bacteria, we must still remember that bacteria circulate in the blood far more often than we realize, and will find their way to those portions of the body where conditions are favorable to their growth. No one of us doubts that what one might call spontaneous infection will occur when the skin is unbroken. We cannot, therefore, doubt that if we leave behind us a bruised and bleeding part infection will follow in a certain proportion of the cases. Particularly to those of you who are concerned with the training of the doctors of the future I would commend the Doctrine of the Prepared Soil. I would beg of you to introduce this into the confession of faith of your surgical pupils and to bring them to the high estate of the surgeon duly impressed with the view that they must respect the minds and the bodies of their patients quite as much when under an anaesthetic as they do in everyday life. Instill into them a decent respect for the tissues of others to the end that the art of surgery may come more smoothly to its fruition.

PRENATAL NEGLIGENCE AND LOSS OF POPULATION*

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WE have for years been absorbed in the prevention of infant loss, that is, in the prevention of losses from death amongst children born alive into the community. Great progress has been made and such losses have been notably reduced.

But in dealing with what is officially designated as "infant mortality," that is, with deaths of children born alive, we have been dealing with the smaller and less serious sources of our total losses. Back of the losses by death amongst children born alive are the losses by deaths of children in utero or at the moment of birth—whether premature or full term—which are classified usually as stillbirths, and back of this loss again is the loss of prospective children through miscarriages.

Of stillbirths we have official records; but such records are not included in our official infant mortality rates. Thus we have officially dismissed stillbirths from consideration as part of our losses; we have allowed the question of whether or no a child at birth breathed once to place that child in the group of live births and so in a group to be considered and cherished, or in the group of stillbirths and so in a group to be disregarded entirely. This is an utterly inconsequential criterion on which to base so radical a distinction. Miscarriages also receive, as a general rule, no official attention, and of course do not enter into the ordinary infant mortality rates. Yet from the point of view of the race both stillbirths and miscarriages are of great importance, indicating as they do potential citizenship lost to the population. These are as much losses as are the losses from infant mortality. The losses occur at an earlier stage, it is true, but the loss is equally conclusive; and is due to causes equally preventable.

We know our stillbirth loss approximately; and if we follow Morgan of Toronto in considering the miscarriages to reach a figure

which averages about double that of the stillbirths we are able to estimate for London, Canada, as shown below, that in 1920: (a) about two-thirds of the total loss of prospective citizens before the age of five years (including in the list miscarriages and stillbirths as well as deaths following premature and full term births), occurs at or before the birth of the child, or so soon afterwards as to imply natal or prenatal causation; and is therefore amenable only to preventive measures taken at or before birth; and, conversely (b) that about one-third only of the total loss of prospective citizens occurs as the result of post-natal causes, i.e., of causes beginning operation after birth, and therefore amenable to preventive measures taken after birth. This makes quite evident the fact that ordinary "infant mortality" is but a fractional source of our total losses.

The following tables, constructed in most part from actual figures obtained in London, Canada, concerning the year 1920 illustrate these facts as borne out in such a typically Canadian community of fairly average composition, having a population of about 60,000. Comparative calculations show that the same proportions apply throughout Ontario, perhaps throughout the Dominion.

Total Losses in London, Can., Before
Age of 1 year, 1920

Before the 7th month of pregnancy, miscarriages	112 (est.)	112
At or before the 9th month of pregnancy, Stillbirths (actual figures)	56	
Premature (actual figures)	30	86
In the first month of life (actual figures)		47
In the 2nd to 6th months, inc. (actual figures)		46
In the 7th to 12th months, inc. (actual figures)		31
		322

*Read before the Canadian Medical Association, Halifax. July, 1921

Total Losses in London, Can., Before
Age of 5 Years, 1920

Total loss at or before full term (the miscarriages included are estimated, other figures actual)	198
Total loss, during 1st year (including 39 from prenatal causes; excl. miscarriages, stillbirths and prematures, dying)	122
Total loss during 2nd year	20
Total loss during 3rd year	7
Total loss during 4th year	5
Total loss during 5th year	4
	<hr/>
	356

(Two-thirds of the losses following full term births were due to nutritional troubles or to infection.)

Note (a) that a great concentration of loss is found in the earlier stages of development and that a rapid diminution occurs as development increases.

(b) That only 10% of the total loss occurred after the age of one year.

(c) That over half (198) of the total loss (356) up to 5 years of age occurred at or before birth. The losses from miscarriages, stillbirths and premature births are clearly of prenatal or natal origin. But a scrutiny of the causes of death of the group of 122 deaths occurring in the first year demonstrated that 39 of these were clearly natal or prenatal in origin also, i.e., due to natal or prenatal causes, operating after birth, such as congenital defects, malformations, injury at birth, weakness at birth, convulsions, etc. Hence of our total loss up to 5 years of age (356) at least 237 (198 and 39) were due in London to such natal or prenatal causes; such causes thus being responsible for 66.5% of the total loss.

Note that these figures are based on a stillbirth rate of 3.7 (stillbirths to total births, including stillbirths) and (since the miscarriages have been estimated from the stillbirths) on a corresponding miscarriage rate of 7.4. If we take Morgan's estimate of stillbirths throughout the country as averaging 5% of the live births (and miscarriages 10% of the same) then London is low in stillbirths (and miscarriages) by about 25%.

The reported stillbirths in Ontario in 1919 constituted 3.9 of the total births (including stillbirths): Morgan's estimate is therefore well above the figures reported for the Province, and should not be applied directly to them.

The London figure for total loss from natal

and prenatal causes (66.5%) if applied to the Province, would probably not be at all an exaggerated figure. The statement then that two-thirds of the total loss of child-life under 5 years of age (including miscarriages, stillbirths and premature who die) is due to prenatal causes, can be checked in part as above against the figures for the Province. Unfortunately the Provincial figures for premature births as distinct from stillbirths and full term births are not available; also Provincial figures showing clearly which of the full term births die from prenatal causes, which from post natal are also lacking. The calculations which are available for 1919 nevertheless show that the calculated number of miscarriages for the Province (double the stillbirths, or 7.8%) may be reduced about 7% without reducing the Provincial percentage of deaths due to prenatal or natal causes below that of London.

Figures applicable to these calculations are still less available for the Dominion than for the Province of Ontario, but may be assumed to run not less than those for Ontario.

Causes of Prenatal Losses

Unfortunately the returns made by physicians do not indicate for stillbirths or premature deaths the conditions resulting in those deaths. Tabulations from the registration records are therefore impossible. For the 39 deaths of infants after full term birth, classified above as due to natal or prenatal causes, "congenital defects," "malformations," "weakness at birth," "injuries during labor" and such like cover the ground. Such terms aid us little, however, in arriving at immediate causation.

The more detailed studies possible in large hospital maternity services make it very probable that prenatal causes may be divided into classes related to heredity, disease and nutrition.

Feeble-mindedness, Syphilis and Malnutrition.

Under heredity, feeble-mindedness, with all its ramifications and shadings, is perhaps the leading factor in prenatal loss; under disease, syphilis; nutrition includes both under and over-nourishment, the former doubtless the most important.

But such a grouping of prenatal cause is not to be deduced from our registration records, as they are derived from physicians' reports, for syphilis is rarely mentioned; and the other factors might be non-existent, so far as such reports go.

It is true that there are always objections to be made to hospital statistics as non-applicable to the general community, because hospitals

tend to deal with certain classes chiefly and with the more unusual cases; and to that extent their results are non-representative.

While this objection is rapidly diminishing because of the greatly increased use of hospitals by all classes and varieties of cases, yet, of course, the most undoubtedly conclusive figures would be those derivable from the whole population through physicians' returns, if only such were to be had.

Why are such returns so barren?

Responsibility of Medical Profession for Establishing the Fundamental Facts

It is the medical profession that handles the individual original case. It is the medical profession which must make the vast majority of the individual returns on which our real knowledge of the facts must ultimately be built. It is the medical profession in its daily labors which should feel the need for reliable facts and should do its share in their accumulation. Good citizenship, a proper sense of service to the community as distinct from that due the individual, a proper pride in medicine, and a deep desire to place medicine on its proper footing—all shared in by most of us—will result in greatly improved returns if the methods are pointed out.

Shortcomings of Present Reports

In reviewing the causes of death registered in London, it was lamentable to see in what a small percentage of cases immediate causes of death had been given at all, even in connection with deaths following full term living births.

In the cases of premature and stillborn children, the mere fact of prematurity or of stillbirth seemed to be considered as an all-sufficient return and no cause was assigned for either condition.

Stillbirth is not a cause of death, but a mere end result. It means little more than the statement "dead" would mean attached to an adult death certificate. It does not even indicate whether the child had died in utero, or died after birth without breathing. But in any case, taken by itself, it sheds no light on the cause of the loss and therefore none on the preventability of the loss.

Other weak, inefficient or useless terms may be quoted as follows: Statements quite meaningless as to immediate cause of death:

1. "Birth."
2. "At birth."
3. "Feeding bottle dirty."
4. "Prenatal causes."
5. "Difficult labor."

On the meaninglessness of the terms No. 1 "birth" and No. 2 "at birth" as causes of death no comments can be made which will adequately do justice to the subject. For No. 3, "feeding bottle dirty," we find an excuse in that the physician evidently had a sociological sense of a duty to the community and to relieve it registered a remote cause, which perhaps was as a remote cause, an accurate one. He, however, failed to appreciate the particular place in the scheme of things which he held as the one trained man in contact with this one case, the only man capable of stating the immediate cause of death. It is no real excuse for him to say that he did a service in his report—for even admitting this, he nevertheless failed to render the service which he alone could render. The sum total of his well meant, but misguided, effort is the rejection of his case from record just as surely as though he had made no return at all. He has given an unclassifiable remote link in the chain and has omitted the one final point which he was asked to supply, which he alone could supply. He has done a duty, but with the best of intentions, he has not done his duty.

The even more remote No. 4, "prenatal causes," might have exactly the same said of it, while No. 5, "difficult labor," is again a remote and not an immediate cause. The child was not in labor and could not have died from labor. The child died of an injury received in the course of birth. It is that injury which should be recorded as the cause of death.

A second set of common terms used which are anatomically or physiologically descriptive, but give little or no clue as to immediate cause, nature of causative injury or disease, how the injury or disease was contracted, follow:

1. "Malnutrition."
2. "Convulsions."
3. "Atelectasis."
4. "Weakness at birth."
5. "Marasmus."
6. "Heart failure."
7. "Indigestion."
8. "Diarrhoea."
9. "Haemorrhage."

"Atelectasis," for instance, is undoubtedly an immediate cause of death, for if the lungs fail to receive air into the air cells, life must soon cease. But atelectasis may arise from many causes: (a) maldevelopment of the nasal or other air passages leading to the lungs, or mechanical obstruction such, as mucus, strangulation by the cord, etc.; (b) intense abdominal distention, which in turn may be due to a variety of causes; (c) maldevelopment or extreme weakness of the respiratory muscles; this weakness may be due to malnutrition, to

disease, or to exhaustion following difficult labor; (d) maldevelopment or lack of stimulation of the cerebral respiratory centres; injury to the centres during the process of birth, and so on. It is quite obvious then that the term "atelectasis" by itself gives scarcely more information of a useful character than does the term "non-respiration." The child is dead, and dead because it did not succeed in getting air into its lungs. But why it failed to get air into its lungs is left blank. "Asphyxia" is an even more general term having even less significance, if possible, for it includes "atelectasis" and a wide range of other conditions as well.

"Weakness" (or its technical equivalent, "asthenia"), "indigestion," "convulsions," "diarrhoea," "haemorrhage," are each of them indications of serious disturbances in the body, but none of them indicate the real nature of that disturbance; they do not suggest the possible cause, and block even speculation as to prevention. "Haemorrhage" and "convulsions" are terms so blank that to put either down as the cause of death is practically a complete failure to state the cause of death.

Suggestions

The cause of death in those dying after premature birth is almost always omitted, but should be recorded in all cases and the making of such records constitutes the first of the improvements we would urge. In most of the premature cases in London we are left ignorant on these two points.

It is of value to know how premature the various premature children were, i.e., to know the (intra-uterine) "age at birth." Unfortunately this is seldom, if ever, recorded, and the systematic reporting of this "age at birth" is the second of the improvements in birth registration which should be kept in mind for the future.

Concerning stillbirths also the cause of death is practically never given—probably seldom determined, or, indeed, determinable, without an autopsy. Seldom is the distinction made clearly between stillbirth of premature children and stillbirths at full term. (Premature children, stillborn, are usually registered as stillbirths, not as premature.)

The third improvement would consist therefore in reporting the intrauterine "age at birth" of stillbirths; the fourth would be, the reporting of the causes of stillbirths. A fifth and exceedingly important improvement, the carrying out of which would yield an immense amount of invaluable information, of an exact

character, is one in which both physician and parent should co-operate in the interests of the race, namely, the performance of an autopsy in every case of early death, whether the child be premature or stillborn.

The reasons for urging very strongly this turning of attention to premature and stillborn infants may be summarized thus:

(a) The great percentage which losses, under these heads now form of the total loss. Surely no group of this size should escape minute attention.

(b) The susceptibility of this group to reduction by preventive measures, directed to the care of the mother, medically, surgically and through hygienic and sanitary channels. An accurate knowledge of the causes would lead to specific measures to prevent their operation.

(c) The fact that consideration of this group leads to consideration of that phase of infant welfare which aims at the elimination from reproduction of the unfit for reproduction, particularly of those who produce children defective mentally, as well as those who produce children defective physically or hopelessly diseased.

Recommendations

The recommendations which naturally grow out of these studies are here summarized:

(1) Because two-thirds of the total loss of infant life (including miscarriages and stillbirths) is due to prenatal or natal causes (the former greatly preponderating) the medical profession as a whole, all interested citizens, and the public generally should direct their attention especially to the physical condition of women preceding the prospective births of their children—particularly with regard to disease, nutrition and heredity in the broadest senses of those terms.

(2) Because at least two-thirds of the recorded loss of infants born alive at full term are due to nutritional diseases, or to infectious diseases, the former largely dependent on artificial feeding as against proper nursing with human milk, the attention of all concerned should be concentrated on securing to the young infant (a) human milk, (b) protection from infectious diseases. No more startlingly misleading and often fatal teaching exists than that which implies that infectious diseases are relatively light and harmless in young children. The actual facts, as opposed to the traditions show that mortality in children from the ordinary infectious diseases is found especially at the younger ages. The vast bulk of the deaths from the infectious diseases of chil-

dren occur between the ages of 1 and 7, principally before the age of five.

(3) That, to secure these ends, systematic prenatal care for prospective mothers, and systematic infant feeding for young babies, should receive every encouragement from the medical profession, citizens and the general public.

(4) That boards of health should receive the hearty support and intelligent co-operation of the same groups in every effort at minimizing infections of every kind.

(5) That the proper legislative and sociological methods for prevention of the marriage of the unfit should be studied with the object of preventing the reproduction of the unfit, especially of the feeble-minded.

(6) That the proper training and instruction of the fit should be provided by courses in housewifery in the public schools designed for girls from the age of 12 upwards, following the extremely successful plan initiated in New Zealand.

DANGER SIGNS IN DISEASES OF THE GASTRO-INTESTINAL TRACT AND DIFFERENTIAL TESTS*

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THE chief object of this paper is to impress upon physicians the knowledge that certain common gastro-intestinal symptoms may arise from the gravest maladies, for it is remarkable how many forget this. Their mistakes are more from carelessness than ignorance, though sometimes, perhaps, from that habit of mind which leads far afield, since they consider every possible cause for the patient's symptoms except cancer, the early diagnosis of which is important and should have first thought; and it reminds us of that incident in Mr. Pickwick's visit to his friend, Mr. Wardell. It is a beautiful morning, and the beneficent gentleman springs from his bed, thrusts his head through the lattice of his chamber, and is lost in an enchanting reverie. "'Hallo' was the sound that roused him. He looked to the right, but saw nobody; his eyes wandered to the left and pierced the prospect. He stared into the sky, but he was not wanted there, and then he did what a common mind would have done at once—looked into the garden, and there was Mr. Wardell." Now, it is not meant that we should attempt to diagnose a disease because it is suggested in a symptom until we have obtained the evidence embraced in a full history and complete physical examination. You all recall instances where physicians have told patients that their headaches and "bilious

attacks" came from trouble with the stomach or bowels or appendix, while the eyes or ears, or mouth or nose fairly called aloud that the source of the mischief lay with them. But, in some patient's history there will appear a symptom which we know is often the harbinger of danger, and we should give this special attention and determine the cause through every means at our command.

First in this symptom-group associated with serious disease of the stomach and bowels, is recurrent diarrhoea, and especially if the patient had been previously well. I have been so shocked by fatalities from unrecognized cancer of the bowel, in young persons, particularly, that I have given this prominent and almost unfailing symptom first consideration, for, if cancer of the bowel be early recognized, I believe many lives may be saved. Diarrhoea of a few weeks' duration, whether in the young or old, and regardless of the manner of onset, would now lead me, with the experience I have had, to think first of cancer, and then of tubercular or other non-cancerous ulceration of the bowel. The history is often deceptive because it states that a number of people were attacked with bowel trouble at the same time, presumably from having eaten of the same food. A careful rectal examination, especially a digital one, should be made at the first consultation, certainly at the time of the physical examination. Even a small growth of the rectum or lower end of the sigmoid (a common location for cancer), can always be found in this way; and

*Read before the Canadian Medical Association, Halifax, July, 1921.

there is no such trustworthy means for detection of cancer and even simple ulceration in this locality; an x-ray examination will not aid, and a proctoscopic examination, unless made by an expert, may overlook the trouble. But I am convinced that the x-ray can almost certainly determine the presence or absence of cancer above the rectum or lower end of the sigmoid. I emphasize this exception to the value of the x-ray examination, since its certainty in locating growths in other parts of the gastro-intestinal tract leads many to assume, incorrectly, that it gives final information in this region. If a digital examination of the rectum shows the mucous membrane smooth and soft, then the stools should be examined for blood. The Benzidine test * is so simple that every practicing physician should know and use it, and it takes less time and skill than a urinary examination. If the stools show no occult blood †, the diarrhoea is not caused by cancer, with the rare exceptions of some scirrhous cancers of the bowel, not involving the mucosa, and cancer of the pancreas. Neither is it tuberculosis nor any other ulcerative affection of the bowel. Such a negative finding is a great satisfaction to the patient as well as the physician. A positive occult blood test is invariably obtained in cancer, tuberculosis, and any other serious ulcerative condition of the gastro-intestinal tract, except ulcer of the stomach or duodenum.

To show what a tragedy may follow neglect to learn the actual cause of a protracted diarrhoea, I state briefly here the clinical record of a young man: A theological student, twenty-four years old, came to me with the history that two months before he had had an attack of diarrhoea which persisted ever since. Previous to this trouble, his bowels had been regular and he had always been well, except for an attack of jaundice when a child. The diarrhoea developed, as he thought, from eating ice cream at a picnic, as others were afflicted in the same way, but they recovered. The looseness of the bowels continued off and on, and the patient treated himself for four weeks and was nothing bettered. Then he consulted the local doctor, who sent him to a hospital. While there he improved, but, returning to his studies, was soon as bad as ever. He had

lost seventeen pounds, and was spare, but of fair color, though the general appearance was suggestive of tuberculosis. The abdominal examination showed nothing abnormal except tenderness along the lower sigmoid, but I did not make a rectal examination. The stomach contents and the blood were normal. Two specimens of faeces showed a large amount of occult blood, but no parasites, ova, or tubercle bacilli were detected. I sent him, with a tentative diagnosis of ulceration of the sigmoid, to one of our largest hospitals for complete investigation. It seemed that, while there, everything was done to find the nature of his disease, including an x-ray and even a proctoscopic examination, but evidently no digital examination was made. At the end of two weeks the diagnosis was still doubtful, and a visiting surgeon was consulted upon the advisability of an exploratory abdominal operation. This was performed the following morning, and I was present. On entering the operating room the surgeon looked up and said, "What is your diagnosis, doctor?" I replied, "Ulcerative colitis." He said, "I have found inoperable cancer of the rectum, involving the bladder and other tissues. I am making a colostomy"; and later remarked, "This patient's case ought to be a lesson to all those present." I am sure it was to me. Valuable time and distress of further investigation would have been saved the poor fellow had I made, at his first visit, this examination for which the history called. The surgeon who operated told me that he had nearly made a similar mistake, for he had completed his examination of the patient and was leaving the room when, on second thought, he returned and made a digital examination of the bowel. To his surprise, he found a growth in the rectum, which was easily felt and, undoubtedly, malignant.

When making a rectal examination, if we find the lower bowel empty while the sigmoid is filled or distended, it is evidence of mechanical obstruction, associated with spasm. Under these conditions the obstructing growth may be felt, bimanually, but the spasm has a habit of relaxing and the distention disappears. Then on repeating the examination with the sigmoid empty, we may be unable to feel the growth, and, unless we have felt the characteristic rigid and ragged opening at the location of the tumor, we are undecided. An x-ray examination may not help us here, as shown by this patient's record: I examined a woman 55 years old who had been operated upon six weeks earlier at one of our large hospitals, where she had been sent for diagnosis with a history of pain and distress in the lower bowel, diarrhoea and haemorrhoids. The gastro-intestinal tract was examined by the x-ray with

*During the war I was unable to get a benzidine preparation that gave satisfactory results. I am now using benzidine, Calco Chemical Co., New York City, which makes a perfectly clear solution and gives excellent results.

†Occult blood was a term suggested by Boas and, as you all know, means blood that is not detected by the naked eye, but must be determined by chemical or microscopic means.

bismuth, and a negative finding reported. Then followed an operation for haemorrhoids, and in three weeks she was home; but when up and about her old trouble returned. She was a large woman, still obese, and was having offensive, loose, and bloody discharges from the bowel. At my first examination the rectum was found empty and the descending colon and sigmoid filled, and by pressing the hand over the filled sigmoid and as high as the examining finger could reach through the bowel, there was felt a mass with an irregular, ragged opening, and I made a diagnosis of cancer. A few days later I examined the patient again, but could find no tumor. An x-ray examination with a bismuth enema was again made by one of the very best roentgenologists, but nothing abnormal was found. When the sigmoid again became distended, the tumor, as before, was easily felt, and the surgeon who had before operated upon the patient made a colostomy for relief of an inoperable cancer of the lower sigmoid.

Persistent loss of weight is a common sign of alarm, and, though common to most diseases, I speak of it here as one of the earliest symptoms of cancer and other grave diseases of the gastro-intestinal tract. We could quickly eliminate cancer should we obtain a number of negative tests for occult blood in the stools, for, with rare exceptions, absence of blood rules against cancer sufficiently advanced to produce noticeable symptoms. On the other hand, the presence of blood is, of itself, only contributory evidence of cancer, but taken in connection with the clinical finding, it is generally decisive, although, in reaching this conclusion, we must eliminate other sources of blood than cancer or ulcer, as nose, teeth, haemorrhoids, and blood-containing food. But this is not the way we should investigate any symptom or group of symptoms, for there is no short-cut to a trustworthy diagnosis; an opinion on any serious symptom, worth anything, depends upon investigation as systematic and complete as we can make it, including every ordinary laboratory test, such as examinations of the blood, stomach contents, urine, and faeces. With this evidence sifted and weighed, a good diagnostician is pretty sure whether the loss of weight comes from cancer or ulcer of the stomach or bowels, or is dependent upon tuberculosis of the lungs, a chronic luetic trouble, or unrecognized diabetes. Besides, I have learned that it is disastrous to allow a decision thus made to be set aside except on indubitable evidence obtained through other tests. Often, however, we need information from what I would term extraordinary means, as the Wassermann test and examinations by the x-ray

and especially with the fluoroscope as well as with plates. X-ray examinations of the gastro-intestinal tract are not yet infallible, but I am convinced that in experienced hands they can demonstrate nearly all ulcers and cancers of the stomach and duodenum, and locate most cancers and many other conditions of the bowel. I do not know in how early a stage cancer of the stomach can be detected by x-ray, for who sees the very early stages? The earmarks of very beginning cancer, I think, have not yet been learned.

There is a group of symptoms found in middle life and after, which directs our attention to the lower front chest, under the breast bone and below the ensiform, which is described as a pressure or pain, sometimes very severe, and often accompanied by belching or a feeling that this would give relief. It occurs soon after meals, and soda or hot drinks usually benefit. These are the usual causes: angina pectoris, ulcer, cancer of the stomach, cardiospasm, and gallstones, and more than one of these conditions may be present. I have found, while these symptoms are usually thought to be from indigestion, that the patients are suffering, as a rule, from disease of the heart and arteries, and that the symptoms are anginal in character. Quick differential tests pointing to the heart are: Sudden exertion usually precipitates an attack, and nitroglycerine relieves it, and we will probably find an enlarged heart and low blood pressure. The stomach contents, when expedient to make the test, are quite invariably hyper-acid, which is in keeping also with ulcer, but at variance with cancer; but there is almost always increased gastric motility in these anginal cases, and frequently, also, in cancer and ulcer of the upper portion of the stomach, so that the stomach may expell a test meal in fifteen minutes. Absence of occult blood in the stomach contents and stools, except in rare cases, rules out cancer. So that, by one test and another, we approach the real origin of the symptoms.

When choosing the title of this paper I had forgotten how long it takes to speak of a single disease sign with its illustrations, so that I have been able to consider only three or four, and I have not had time to make even these statements less long. But my first aim has been to urge the necessity of quickly tracing to their sources all symptoms that might arise from serious diseases, especially cancer, and I have tried, also, to show the importance of being able to apply laboratory tests in differential diagnoses. If the younger men know the tests, the older men can and must learn them, for

the most valuable are simple ones. Experience, while other knowledge can never supplant it, does not hold quite the same relative value in medical equipment that it did when Doctor Oliver Wendell Holmes (whom I would like to term that incomparable three-in-one—the Au-

torat, the Professor, and the Poet) stated that "the young man knows the rules, while the old man knows the exceptions." (1)

(1) From a valedictorian address delivered to the Graduating Class of the Bellevue Hospital College, March 2, 1871.

RATIONAL EMPIRICISM*

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To some minds the term rational empiricism almost implies contradiction, but it has for long seemed a proper one to me, and I was glad only the other day to come across an address delivered in London some years ago by Sir Dyce Duckworth in which he repeatedly used it.

By rational is meant wise, reasonable, sane, sensible, discreet, or judicious. The term empiricism has many meanings, and it is only in a restricted sense that it is here employed. In Lippincott's New Dictionary it is taken to mean "The knowledge of physic acquired by experience alone." The word comes from the Greek *empeiria*, meaning experience. The word empiric in the same work means an experimenter, and, in Murray's New Dictionary, "One who, either in medicine or in any other branch of science relies solely on observation and experiment."

Empiricism has also been twisted to mean quackery and imposition, but this is really a misuse of the word if one considers its derivation; and it is scarcely necessary to say that it is only in its true sense that it is here employed.

When the clinician or the pharmacologist experiments with any remedial agent and finds that this, let us say, slows the heart, then he is an empiric. But if, having made such observation, he proceeds to theorize as to how this effect is brought about, and to argue that because the heart under certain conditions is slowed by the drug therefore it will also be

slowed in some other state, then he goes beyond empiricism and enters the domain of theory.

The results of true experiment and observation are usually sound; the results of theory and speculation, although these are very necessary as a ground for further experiment, are fraught with fallacy.

In order to advance in any scientific work hypotheses and then theories are necessary, but these must be constantly checked by further experiment. "Don't think, but try" was the gist of advice given by John Hunter, and no doubt willingly received, when Edward Jenner asked him to theorize upon some physiological question.

How many whole systems of treatment have been founded upon theory which has afterwards proved to be fallacious! I need only mention as examples the humeral theory, the theory of dependence of disease upon phases of the heavenly bodies, and the belief that sickness was due to the influence of evil spirits. Such theories have swayed medical practice throughout the ages and usually not for good.

Lecky (1) wrote in 1873, "Our almost absolute ignorance of the causes of some of the most fatal diseases, and the empirical nature of nearly all our best medical treatment, have long been recognized." And after all, most of our therapy is still empirical in that its value has been discovered accidentally, and in that we cannot explain how it acts. Who can tell when opium was first found to soothe pain and lessen distress? An immense amount of work has been done on this drug since,—with some degree of success certainly in revealing its com-

*Read before the Canadian Medical Association, Halifax, July, 1921.

position and in showing to which alkaloids it owes its special effects, but the sovereign action of the drug stands where it was handed down to us from unknown times.

Digitalis is perhaps our next most useful drug. It had a place in the London Pharmacopoeia of 1650 and several subsequent editions (2), but was then, strange to say, dropped from official recognition for over a hundred years, and Withering in the end of the eighteenth century learnt of its value in cases of dropsy from an old wise woman, who had the secret of its use handed down to her.

The favorable action of cinchona in fever and ague was always known to the natives of South America, and Joseph de Jussieu related in 1739 (3) how the use of it was first made known to a Jesuit missionary who, being attacked by intermittent fever, was cured by the bark administered to him by an Indian near Loxa.

In an account of Brazil written by a Portuguese friar in 1625 (4) mention is made of three remedies for the bloody flux (i.e. dysentery), one of which is ipecacuanha, and ipecacuanha still stands first in the treatment of amoebic dysentery.

One might go on to mention nearly every drug that has proved of undoubted value and to show that it has been discovered empirically, but I will not labor the point.

As an example of recent empiricism I might mention non-specific protein therapy. It was found by chance that inoculation with typhoid vaccine relieved gonorrhoeal arthritis, and then that injections of peptone acted almost as well. We are still in the stage of hypothesis as to how these non-specific proteins act, but the empirical fact stands out that they have some curative effect.

As Sir Dyce Duckworth said, "We must not forget that empiricism has often anticipated science in the practice of medicine. Clinical experience has certified the value of some drugs whose action the scientist has long subsequently learnt to explain, and there are still many remedies of which the action is well assured whose exact action remains to be explained on a scientific basis. Empiricism aids scientific medicine by affording suggestions and indications for further research." (5)

The empirical use of diet is instructive. Races of peoples have learned everywhere what diet on the whole best suits them in their environment, and although individuals have often erred, some in the direction of excessive intake, and others in the direction of harmful abstemiousness, still, the general rule holds that most people take what on the whole suits them. From time to time eccentric persons have ad-

vocated special systems of diet, and even highly scientific men have urged great limitations of certain elements of it, and have shown, for example, how persons can live for some time on a greatly restricted protein intake, but these ripples in the pool of general experience do not disturb the multitude, which still continue to eat and drink according to the silent calls of their tissues. It is not for a moment suggested that when disease exists the diet should not be most strictly controlled, but among healthy people there exists an innate sensation which tells them what to eat, and when to stop, and this guidance is usually correct. I venture to say that even the members of an audience like this eat and drink according to their inclination, and that very few indeed are aware of their total daily caloric intake, or of the number of grammes of proteins, carbohydrates, hydrocarbons, salts or water that they consume.

While on the subject of diet let me quote from a recent lecture by Professor Halliburton (6). He says, "Before I leave the subject of diet may I unburden myself of a suggestion? Empiricism is not always to be condemned. What we call empiricism is frequently the result of past experience. As an example, take a prescription of cod liver oil, or of butter and cream. A few years ago it would have been impossible to explain why these forms of fat are superior, we will say, to olive oil and vegetable margarine. The mere fact that they are superior was empirical, and now the practitioner has been fully justified, and research has at last told us the explanation, namely, the existence in the fats, which are the more valuable for remedying in nutrition, of a health-giving vitamin. May not this in future be repeated? If you have high blood pressure, why does your medical man tell you you may take fish and poultry and eggs, but that you must abstain from beef and mutton? I can picture a sceptical and argumentative physiologist saying, 'Why! the materials you mention and I am advised to take or refrain from taking are in the main composed of protein, and surely it is not physiological to give me such futile advice.' My answer to this would be, 'True, it is not explicable on physiological grounds. It is the mere result of empirical experience. But wait a few years, and it is quite on the cards that by that time science may have stepped in and explained the puzzle, just as a few years ago it was able to explain why cod liver oil is better than olive oil.' There is probably in the harmful meats some hitherto unrecognized principal, unrecognized because it is present in minute quantity, or it may be the absence of an indispensable material. 'There is one kind of flesh of men, another flesh of beasts, and

another of fishes, another of birds.' I wonder if St. Paul ever imagined these pregnant words contained more than what he intended to convey by them!"

The gifts of empiricism to the prevention of disease have been enormous. These were chiefly in the direction of avoiding the unknown causes of infection, and numerous empirical rules of life, such as the Mosaic laws, hold good to-day. These rules were often raised to a religious status.

Natives of India believe that when smallpox is raging it angers the goddess of the disease, Sitala, for the friends of the sick man to go near him, and it is also for the same reason inexpedient that they should travel. Evidently the united experience of many generations had shown that if they went near a case of smallpox they were apt to get the disease themselves, and further if, having been near such, they travelled elsewhere the disease tended to break out where they went. Thus was the value of quarantining empirically established.

We occasionally meet with practitioners who in a lofty way say that one should not use any remedy the action of which cannot be explained. Such treatment they characterize as empirical, using the word in a restricted and narrow sense. But surely this is a wrong view to take. We do not yet know the exact cause of many of the commonest diseases, such as measles, mumps and probably influenza, and it is only as yesterday since the infections producing malaria, cholera and syphilis have been revealed. And yet in the meantime all of these conditions have been treated more or less successfully empirically.

When a therapist is told that a remedy X relieves a patient suffering from a condition Y, then his first care should be to sift the evidence in favor of this conclusion, and if this evidence is sufficient to prove that X really influences for good the sufferer from Y, then it is his duty, while endeavoring in every way possible to try to find how X works, in the meantime to use it for the relief of his patient. For instance, some surgeons have recently found that in cases of tympanites the rectal injection of tincture of digitalis is of value. It is hard to understand exactly how the good results are here brought about, but if they do occur then it is wise to use the remedy.

Pharmacology has much the same relation to therapeutics that physiology has to medicine, and just as the more physiology the physician knows the better he will understand disease, which is only altered physiology, so the more pharmacology the therapist knows, the better he can understand and explain the action of his remedies. But physiology can-

not yet interpret all symptoms of disease nor can pharmacology yet show how all remedies act. As Reilly of New York recently put it, "The teaching of all therapeutics from the standpoint of pharmacology is a failure," and I am inclined to agree with him. The reaction of animal tissues to drugs is often very different from that of the tissues of the human body; and, further, a healthy human being may react very differently to a drug to what a diseased one does; and lastly and very importantly, human beings are not all alike. Even Ford cars and Waterbury watches vary in their working, and how much more human beings, each with his load of hereditary tendencies and idiosyncrasies, his mental poise, and his environment.

It is necessary to remember that the practice of medicine is still largely an art rather than a science, and that empiricism has often anticipated science. In Mill's Logic we read, "The instances of new theories agreeing with old empiricisms are innumerable." And Huxley wrote (7), "Hippocrates certainly knew very little, indeed practically nothing, of anatomy and physiology. . . . Nevertheless, in so far as he, and those who worked before and after him in the same spirit, ascertained, as matters of experience, that a wound, or a luxation, or a fever, presented such and such symptoms, and that the return of the patient to health was facilitated by such and such measures, they established laws of nature, and began the construction of the science of pathology. All true science begins with empiricism."

In medical treatment we judge by results. Professor Chauffard of Paris said, "One must not forget that in the matter of treatment it is clinical observation which rests as the final judge. It is the doctor at the bedside of the patient who has the last word and controls all the methods. It is he who decides as to the value of apparent progress. It is through him, it is by clinical observation, that acquisitions are judged as lasting and valuable, or, on the contrary, fall rapidly into oblivion." (8)

Empirical medicine will not by itself go very far, but it is the foundation of scientific medicine and it ill becomes anyone to scoff at it.

In nature evolution consists in experiment. Thus varieties occur in tissues and in habits, and if these benefit the organism in its struggle for existence they persist, but if they do not do so they die out. We see evolution in treatment; when any change or novelty in this is successful, it persists, but not otherwise. The difficulty is to judge the success. As Withering pathetically wrote in 1785, "It is much easier to write upon a disease than upon a rem-

edy. The former is in the hands of nature, and a faithful observer with an eye of tolerable judgment cannot fail to delineate the likeness; the latter will ever be subject to the whims, the inaccuracies and the blunders of mankind."

In regard to all forms of treatment, empirical or otherwise, we must "prove all things; hold fast that which is good."

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NOTES ON LOBAR PNEUMONIA IN FRANCE

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MAJOR Lawrence J. Rhea and the writer had already published some notes (1) on 65 cases of lobar pneumonia which were seen during the first half of 1917. The "Pneumonia Hut," with its 12 beds, was kept on in full swing, and between August, 1917, and August, 1918, excluding about 60 cases following the inhalation of poison gases, 181 cases of pneumonia were under the care of the writer. Lobar pneumonia was diagnosed in 104 of these cases and broncho-pneumonia in 77. Amongst these latter were about a dozen "influenza pneumonias" in the first wave of the pandemic. Probably some mistakes were made on both sides in dividing the cases into the two classes, but each case was looked at from all points of view before the final diagnosis was made. The treatment of lobar and confluent broncho-pneumonia is, of course, very much the same, but it is important to aim at an accurate diagnosis. Eighteen of the 104 patients died and practically all of the autopsies were done by the writer.

Notes were made on the usual army case cards, but subsequently all the details, together with an abbreviated temperature chart, were set out in columns on large sheets of

"squared" paper. These rather elaborate records have been kept and by waiting until now, it has been possible, through the kindness of the Medical Research Committee to follow the subsequent history of many of the cases.

Local or Convoy Patients—The hospital received the "local sick" of the Boulogne Base, from nearby camps or off transports. Eighty-six of the cases with 15 deaths were "local" admissions; 18 were admitted from convoy, with 3 deaths. As broncho-pneumonia is not so easily diagnosed early in the course of the illness as lobar pneumonia, it is not to be wondered at that proportionately a much larger number of broncho-pneumonias were sent down by convoy.

Length of Foreign Service—One patient was admitted on his first day of duty in France, four on the fifth day, one on the sixth day and three on the seventh day, whilst sixteen had served for two years with the B. E. F. and fourteen for three years or more.

Month of Admission—Eight patients were admitted in August and four died; but three of the fatal cases were in negroes taken off a crowded transport. September, three admissions with no deaths; October, nine, no deaths; November, seven, deaths nil; December twelve, no deaths; January, fourteen cases

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three deaths; February, one admission, recovered; March, fifteen, with three deaths; April, thirteen, with four deaths; May, ten cases, four deaths; June, seven cases, none fatal; July, five, with no deaths. It is much to be regretted that typing of the pneumococci was not carried out, for such a proceeding might have thrown some light upon the low mortality amongst the autumn patients.

Age—The majority of the patients were between 21 and 40. There was, generally speaking, a higher rate of mortality amongst the older patients.

Nationality—British Isles, 78 patients with 12 deaths (15%). Canada, three patients, all recovered. Australia, 14 patients, three deaths (21.5%). British West Indies, nine patients and three deaths (33.3%). It is noteworthy that Australians and New Zealanders were very prone to attacks of pneumonia.

Previous History—Five of the patients had had pneumonia before, but none of these died. Seven of the 104 patients confessed that they had been accustomed to large amounts of alcohol, and curiously enough none of these men died. Other records of previous histories seem unimportant.

Clinical Course

Onset—This was sudden in 78 cases and gradual in 36. One came to realize clearly that lobar pneumonia may begin in one or two ways: (1) the patient, apparently in good health, is struck down "out of the blue" with a sharp pain in the side and chill, and in a short time spits up blood or rusty sputum. Or more rarely (2) there is a history of having had a cold or bronchitis for several days and the patient may, or may not, have been in bed; he becomes shivery, more severely ill, and more dyspnoeic, with or without pleuritic pain as the primary serious symptom.

One patient, who had already had pneumonia twice before, was slightly gassed whilst lying out in a shell hole. Three hours later he experienced a sharp pain in the right side on breathing. He was sent down from the C.C.S. the next day. On admission there were practically no signs of gassing: merely slight suffusion about the eyes, but no aphonia. The sputum was glairy, homogeneous, and rusty; not at all like that in the gas pneumonias. Defervescence occurred by lysis on the fifth and sixth days after the upper and lower lobes of the right lung had become consolidated. There had been severe diaphragmatic pleurisy with respiratory rate of 60 and great delirium. Whether the slight gassing had played a part

in causing this case of lobar pneumonia is a difficult question to answer, but "gas pneumonias," in our experience, were always of a bilateral diffuse broncho-pneumonic type.

In four cases lobar pneumonia commenced in the hospital after admission for some other complaint. The most interesting of these patients had his tonsils removed and two days later, with a chill and rise of temperature of 104°, lobar pneumonia developed. Crisis occurred on the eighth day.

One soldier at the front received a slight scalp wound in the occipital region. Within 24 hours he was admitted to the 3rd Canadian General Hospital and almost immediately lobar pneumonia developed and with it meningitis (pneumococcal). He died on the fourth day. This case will be more fully described later.

Herpes—Thirty-six of the patients showed herpes and only three of them died. During the previous six months in France, herpes had not proved to be a favorable sign. In several of the cases the vesicles were not on the same side as the lung affected. They were not merely labial or nasal in all the cases; in one instance, which remains vividly in one's mind, the vesicles covered the whole of the right ear, and in another case they were in a large patch below the angle of the right jaw. It is of some interest to note that in one case herpes did not appear until the eighth day, the crisis following on the ninth.

Temperature—In forty-eight of the cases the temperature fell by crisis: 13 on the ninth day and 11 on the eighth. One case showed a critical fall on the fourth day and two patients had their crisis on the twelfth. In thirty-six cases the temperature fell by lysis; in seven cases reaching normal on the eighth day, in four on the ninth and in six on the tenth day. At one extreme the temperature came to normal on the fifth day, and at the opposite extreme this did not happen until the twentieth in one case, and the thirty-third in another.

Amongst the 41 patients who recovered by crisis there were 14 cases of double pneumonia, and of the 36 that recovered by lysis 11 had pneumonia in both lungs.

Empyema developed in two patients after pneumonia, and they were operated upon in France, but are not included amongst the cases of resolution by crisis or lysis given above. They will be dealt with under "complications." There were several other patients who exhibited rises of temperature after crisis or lysis. Their charts are amongst the most interesting of the whole series, but it is very doubtful if we can always supply a satisfactory explanation of all these vagaries of temperature. Even after crisis, in cases where the

patient feels absolutely well, the temperature often shows little rises to about 99.5° for a few days. Empyema, of course, is the most frequent cause of persistent fever, and the needle was often used to try and exclude such a condition. The late Colonel John McCrae used to express the opinion that an infection might remain in the pleura for some time after the active disease in the lungs was over and never go on to the formation of a collection of fluid or empyema. There was one instance of pleural friction persisting from the time of lysis on the 13th day until the patient was sent to England with temperature normal on the thirty-third day after onset of the illness. During this time there was an evening rise of temperature to about 100° . Aspiration on the 24th day had failed to find pus. It is gratifying to learn that six weeks after arrival in England the patient was discharged to duty with no mention of any complication being found. Another case was thought to be one of delayed resolution: in England the patient was in hospital for two months as "lobar pneumonia convalescent," and after two months more at a convalescent hospital he was discharged to duty. A further patient had a pneumonia with an anomalous course; it was double and he was very ill, but the temperature came down by lysis on the tenth day, only to rise again gradually on the thirteenth and subsequent days. There were rapid rises, unaccompanied by chills, every day or every other day to 101° or 102° until the thirtieth day, when the fever ceased, and he was sent to England on the thirty-third day. During all this time there had been rusty or bloody sputum, the respirations in the second access of fever were 22-24, but often the pulse was 100-116. Unfortunately no notes of his stay in England are at present available.

In the case of one man of 38, who had typical double lobar pneumonia of the lower lobes, with chill at the onset, rusty sputum, and herpes on nose and face, the temperature came down by crisis on the sixth day, but soon began to become intermittent and later remittent. Pleural friction persisted: there were no chills or sweats, and exploratory puncture failed to find fluid or pus. Resolution seemed to be very slow, but he was sent to England with temperature of 100° , pulse 80, and respirations of 20. Soon after arrival in England tubercle bacilli were found in the morning sputum and a month later he was invalidated out of the army. There probably was a chronic tuberculous lesion which was reactivated by an attack of lobar pneumonia.

Extent of Disease and Lobes Affected—In 70 out of 104 cases only one lung was involved,

and in 34 cases there was lobar consolidation in both organs. The right upper lobe was affected 53 times in all and alone in nine cases; right middle lobe 24 times, alone once; right lower lobe 74 times, alone 12; right upper and right lower together 26; right upper and right middle 5; right middle and right lower 6; whole of right lung 13. Left upper lobe 18, alone once; left lower 49, alone 10 times; both left lobes 16. There were no cases of consolidation of merely two upper lobes together; 10 cases of merely both lower; merely right lower and left upper in one case. All lobes were affected in two cases and both were fatal. The mortality in the double pneumonias was 29%, and in the single 12%.

The number of double pneumonias would be considerably greater if those cases were included which showed, on percussion and auscultation, patches of broncho-pneumonia in the lung not affected by lobar consolidation. Rhea and the writer in a previous paper (1) noted that in some cases double lobar pneumonia was diagnosed before death, but at autopsy what was taken to be lobar pneumonia in the contralateral lung, proved to be a patch of broncho-pneumonia. As will be shown below, the sputum may sometimes help one to differentiate between an extension of the lobar consolidation to another lobe and a patchy bronchopneumonia. In 11 cases patches of bronchopneumonia were diagnosed. The sputum was suggestive in six of the eight cases that recovered. In five of them (besides the dullness on percussion noted in all) there were signs of bronchitis, such as large moist râles or piping ones. Three cases died and the diagnosis was confirmed at autopsy. Signs on percussion and auscultation had suggested the diagnosis, but the sputum had not. Patches of bronchopneumonia were found in three other cases after death, although not diagnosed during life. The sputum did not make one suspect bronchopneumonia, but in one of the cases there were signs of a generalized bronchitis.

Sputum—A description of the amount and of the macroscopic appearance of the sputum of each patient was made almost every day. The most interesting findings were noted in the broncho-pneumonias, but some points were noteworthy amongst the cases of lobar pneumonia. The typical sputum in the latter class of case, as is well known, is homogeneous, tenacious and glairy and of a reddish, rusty color. At times there may be considerable amounts of pure blood. In contrast with broncho-pneumonia there is generally little muco-purulent matter. It seems justifiable to look upon the changes in color as being due to the gradual alteration in the blood pigments as is seen in

the subcutaneous ecchymoses of bruises on a schoolboy's shin. Thus almost any shade of red and yellow may be found, or even of brown. Even in the absence of jaundice, the bright yellow color was sometimes very striking. In one case there was a very curious shade of bluish-green, with no jaundice present. In cases with marked icterus the sputum was moss green and later bright yellow.

A careful examination of the sputum cup may sometimes lead one to make a diagnosis before the physical signs suggest anything new. Thus the involvement of another lobe was several times shown by the presence of fresh blood in the cup.

It was sometimes noted that there were two different kinds of sputum (1) glairy, homogeneous, rusty "mucus," and (2) more or less numerous muco-purulent masses of yellowish-white or greenish-white color. Examination of these cases yielded signs of bronchitis and sometimes of patchy broncho-pneumonia as well as of lobar consolidation. Some of the patients, too, gave a history of having had bronchitis for a week or so before the onset of the lobar pneumonia. As pointed out above, a diagnosis of an added broncho-pneumonia was sometimes confirmed at autopsy. It was observed in some cases that, although absent during the height of the disease, muco-purulent matter appeared in considerable amounts after defervescence. Whitish, branched, bronchial casts were coughed up by several of the patients and are not at all uncommon in lobar pneumonia if carefully looked for. A beautiful blood cast was found on one occasion.

The amount of sputum varied very much in the different patients and at different stages of the disease. Five spat up practically nothing before the fall of temperature. As a rule, soon after the fall of temperature, the sputum decreased very much in amount and only a few cubic centimetres, instead of about one hundred, were brought up in twenty-four hours. Some patients expectorated merely a little clear mucus after the crisis. Over and over again it was seen how little of the extensive exudate in the lung is coughed up during the stage of resolution of lobar pneumonia, for, as ascertained after death on one occasion, the consolidated lung may weigh $6\frac{1}{2}$ pounds, and the other one $1\frac{1}{2}$ pounds only. It also seemed that on many occasions it mattered little if the patient in the height of pneumonia did not expectorate. In the cases of broncho-pneumonia expectoration seemed to be a little more important.

Two cases were of great interest. Although both men were perfectly comfortable, and temperature, pulse and respiration remained nor-

mal, they spat up a great deal of very haemorrhagic sputum after the fall of temperature. This is very unusual. What was going on in the lung? Captain McMillan found no bleeding points in nose or throat. Both were cases of double pneumonia, the former patient had his crisis on the seventh day, but bloody or very rusty sputum persisted for nine days after this. He was transferred to England, and, as lately ascertained, convalescence was rapid. He returned to duty in France. The latter patient had his crisis on the eighth day and bloody and very rusty sputum lasted for exactly 14 days afterwards. Transferred to hospital in England, he returned to duty, and in August, 1918, had an attack of influenza, from which he recovered.

Blood Pressure—Readings were taken by the auscultatory method on one or more occasions upon 48 of the patients who recovered, and upon nine of the patients that died. On each of 14 of the patients who recovered, several observations were made; in 10 of these there was a gradual increase of the systolic pressure, with very little change in the diastolic readings. The average age in this group was 28 years. In the four other patients the systolic pressure gradually fell during the course of illness, two of these patients showing a considerable fall in the systolic pressure of 15 and 30 millimetres of mercury, respectively. The average age of these four patients was 34. In all the 14 patients that recovered, there was a tendency for the pulse pressure to increase as the disease progressed. The relation of the pulse rate to the systolic blood pressure was, of course, noted, and amongst the patients who recovered Gibson's rule did not always hold. In two cases, on the day before the fall in temperature, the number of heart beats per minute was greater than the number of millimetres of mercury representing the systolic pressure. These were the only two instances in which this unfavorable relationship between the heart rate and the systolic pressure was found late in the disease. It was a frequent finding, however, during the first few days of the illness, when the heart rate had increased more rapidly than the systolic pressure.

In only three of the fatal cases was the blood pressure taken often enough to tell in which direction the curve was tending. In all three the systolic pressure rose, but the diastolic fell in one case, remained the same in another, and rose in the third. The pulse pressure increased in these three fatal cases. In one fatal case the number of heart beats per minute was consistently greater than the number of millimetres of systolic pressure (six observations). Gibson's dictum, however, was not always true in

the nine patients who died. The number of heart beats per minute in another fatal case was always less than the number representing the systolic pressure, and in several other cases this relation was found to hold at the last observation made, on the day preceding death. In several cases the "pulse over pressure" ratio kept changing from day to day, so that now one and now the other number was the greater. The general impression was gained that often the systolic blood pressure was extraordinarily well sustained until just before death and that if one depended entirely on pressure readings for prognosis and treatment, one would often go astray.

Delirium—This occurred in 20 cases, nine of which were fatal. One patient showed a marked toxic psychosis from the seventh day of illness until death on the sixteenth. He was very sleepless, morose, difficult to manage, and could not be induced to answer questions. There was vomiting and retention of urine. A positive Babinski sign was detected on the left side. The autopsy showed unresolved pneumonia of the right lower lobe, there was no meningitis, but a pneumococcus was grown from the heart's blood. During life the urine had contained "albumin plus" and a few hyaline casts. One patient, an alcoholic, had post-febrile delirium with auditory and visual hallucinations for two days after lysis on the sixth day.

The Urine of only 27 patients was examined: "albumin a trace" was noted in 5, "albumin plus" in 18, eight of whom died, and casts in 15, three of whom died. One patient, aged 27, with double lobar pneumonia, showed some oedema of the face on the 9th day. There was some albumin and casts in the urine. The patient had never been strong, but there was no history of previous nephritis. After transfer to England he was retained in hospital for three months with a diagnosis of "nephritis" and was then discharged to duty.

Complications

Empyema was diagnosed in two patients; both were operated upon and recovered. They have not been noted amongst those patients whose temperature fell by either crisis or lysis. One was admitted on the 10th day of disease, and after tapping the chest several times, pus was found. Portions of rib were resected on the 20th and 21st days of disease and two pockets of pus drained. He was sent to England and eventually recovered, for there is a note to the effect that several months later he was admitted to hospital with influenza and was discharged to duty.

The other patient came to us on the 8th day of his illness, with great pain in his right side and expectoration of blood-stained sputum. Eventually we found pus on the right side. It contained non-haemolytic streptococci, and Colonel Bazin resected a rib and drained. Some clear fluid was withdrawn on the 19th day from the left base, but streptococci grew out in culture. On the 23rd day the fluid in the left pleura had become turbid. It was drawn off and replaced by some glycerine and formalin. The patient was transferred to England on the 37th day of illness, and, after being in hospital for several months, he was finally discharged cured.

Tympanites and jaundice are both serious complications and often occur together. The former was found in 13 cases, 8 of which were fatal. Icteric sclerotics and jaundice appeared to be the more serious, as they were noted in eight cases, six of which proved fatal. In one patient who died showing a marked jaundice, there was also severe hiccough, but no tympanites. Another patient had icterus from the fourth day of disease until the tenth, and defervescence was not complete until the sixteenth. No further notes are available, except that he was discharged to duty after being transferred to England. There was no tympanites in this case. Contrary to expectation, the nine negro patients had no jaundice.

Diarrhoea (unassociated with jaundice or tympanites) occurred in two patients only and both died.

Vomiting was noted in four cases, three of which ended fatally. In one of these there was both jaundice and tympanites, in another jaundice and hiccough, and the third had neither of these other symptoms.

Hemiplegia—Vascular lesions are an uncommon complication of pneumonia, and the case to be described was of very considerable interest. The patient, a neurotic Welshman, aged 31, was admitted from convoy three days after "reporting sick" at the front. He had diarrhoea and functional aphonia. Three days after admission he was suddenly seized with a chill and pain in right upper abdomen on breathing, and his temperature rose to 105°. Double pneumonia developed, he was gravely ill, and at times delirious. The heart was not dilated and no adventitious sounds were heard. The pulse rate averaged about 108, and blood pressure taken on the fifth day was 115 systolic and 80 diastolic. Crisis occurred on the tenth day. The sister-in-charge reported that during the night following the crisis the patient became very irrational, tried to get out of bed, was very peevish and irritable, and had incontinence of urine and faeces. On examination the next morning he was morose and his speech

was "like that of a drunken man," the right eye could not be closed as tight as the left one, there was considerable weakness of the right side of the face and on being asked to show his teeth, his mouth was drawn to the left. The soft palate deviated to the left. There was weakness and flaccidity of the right arm and the right leg. Perception of pin-prick was decreased on the right side. Incontinence of urine and faeces continued for several days, the knee jerk on the right became increased and an ankle clonus and Babinski appeared on this side. Colonel Gordon Holmes, Army Consultant in Neurology, examined the patient five days after the onset of the hemiplegia and diagnosed "extensive cortical thrombosis." Gradually strength returned in the right arm and leg, but more quickly in the latter. Speech became more plain. On the twenty-first day after the onset of the pneumonia, or on the twelfth day after onset, of the hemiplegia and aphasia, he showed merely slight paresis of the right arm and face (he could print letters with his right hand).

He was transferred to England, where recovery was rather slow, and he was mentally confused and delusional during the first month, and for some time was regarded as a "mental case." The Wasserman reaction was negative. He was allowed out on parole, but five months later, whilst in hospital, he had another attack of lobar pneumonia with involvement of the left lung, from which he recovered. Up to this time he had been labelled "confusional insanity, following cerebral thrombosis complicating lobar pneumonia." There is quite a full note of the patient's condition eight months after transfer to England. "No mental symptoms now of confusion or delusion. Knee jerks on both sides brisk. Pupils equal and active. Right ankle clonus and planter extensor response. Slight loss of power right arm and leg. Can walk five miles, goes out daily now. Some signs of agraphia. Speaks English with difficulty, Welsh fluently. Arteries thickened, no cardiac murmur. Has put on weight. Discharged permanently unfit."

The Fatal Cases and Autopsies

Duration of Disease—One patient died on the fourth day of pneumococcal meningitis, two on the fifth, one on the sixth, two on the seventh, one on the eighth, four on the ninth, three on the tenth, one on the eleventh day, one on the sixteenth (with unresolved pneumonia), one on the twentieth (autopsy notes are unfortunately lost), and one on the twenty-third day (of double pneumonia, grey hepatisation of the lungs, streptococcal empyema, and

septicaemia due to streptococcus mucosus capsulatus).

Extent of Disease—Eight cases showed lobar consolidation of one lung only, but four of these had some patches of broncho-pneumonia in the contralateral lung. Ten cases had double lobar consolidation and in two instances areas of broncho-pneumonia were also noted. Pale pinkish lung (characteristic of commencing organization (?)) was noted in the lungs of two patients who had died on the ninth day of disease.

Effects of accidental puncture of the lung were seen in two of these cases. A negro had double pneumonia and on the ninth day of disease the right base was tapped in search of fluid, but merely a little blood was obtained and he spat up a little immediately after this. He died on the tenth day of disease and late grey hepatisation of the lung was seen. There was a little clear fluid on the side that had been explored and both layers of pleura were covered with thick plastic lymph. The exact spot, in which the lung was injured when the chest was needled, was readily determined, for, immediately beneath the visceral pleura a mass of blood-clot of the size of a walnut was found.

Another patient had been very ill and had exhibited the signs of a severe toxic psychosis as described under "delirium." Signs of consolidation had first appeared in the lower part of the left upper, shortly after in the left lower, and later still in the right lower lobe. He became very delirious on the seventh day and crisis occurred on the eighth, the pulse and respirations were much decreased in rate, but the delirium continued. On the two following days the temperature was again at 103° and 104°, then became remittent and intermittent to about 100° (but without chills or sweats) for another three days. The temperature on the fourteenth and fifteenth days was subnormal, with pulse of about 108 and scarcely to be felt at wrist. The white blood cells were 18,000 per cubic millimetre. Although no definite localizing signs were made out, it was thought best to explore for pus. An attempt was made to reach the interlobar fissure on the left side by inserting the needle in the mid-axillary line. The patient was very irrational and restless, but his dyspnoea did not seem to be much aggravated by this procedure. No fluid or blood was obtained. The needle was withdrawn and inserted at the left base. To our surprise, it could be freely waggled about in the pleural cavity and it was realized that a pneumothorax had been caused by the previous puncture. The patient died a few hours later. The autopsy revealed a large mass of unresolved and partially organized pneumonia of lobar type in the right lower lobe. On the left side pent up air

escaped from the pleural cavity and a collapsed lung was found. No consolidation remained, but the bronchioles at the base of the upper lobe were filled with pus. There was no empyema. The needle had ruptured a small bulla at the lower border of the upper lobe and on the pleural surface was a small flake of yellow lymph and in the lung a tiny haemorrhage. From birth the patient had been handicapped, for there was a marked grade of hypoplasia of the heart, spleen and kidneys. It was little wonder he succumbed to an acute infection. Blood culture after death yielded a pneumococcus. Examination of the brain showed no gross abnormality. This was the second time that the writer had caused pneumothorax by exploring a chest for fluid, but on the first occasion, in a case of broncho-pneumonia, no untoward event followed. He now uses a trocar, withdrawing the sharp stylet as soon as the parietal pleura is reached.

Pleural Cavities—Two of the cases of empyema diagnosed and operated upon have been described; both recovered. Five patients, whose deaths occurred between the fifth and eleventh days of disease, showed grey hepatisation of the lungs and also a varying amount of turbid fluid in the pleural cavity on the same side. A sixth patient died on the twenty-third day of disease; all through the illness there had been signs of a spreading pneumonia of both lungs and there was rusty sputum until the end. On the day before death the left pleural cavity was explored and three ounces of turbid fluid, which contained streptococci, were withdrawn. At autopsy there was moderate amount of turbid fluid in the left pleura, but no empyema on the right side. The whole of the right upper lobe, except the anterior border, showed grey hepatisation, there was no middle lobe, and the lower one was very small and only partly consolidated. The left lung throughout was in the stage of grey hepatisation, but the pneumonia in the lower lobe was plainly at a later stage. The heart's blood contained a streptococcosus mucosus capsulatus.

Pericarditis—This was diagnosed in only one case before death, when a faint to-and-fro friction, synchronous with the heart-beat, was heard at the base of the heart. At the post-mortem on the eleventh day of disease the pericardium contained slightly turbid fluid and a smear showed pneumococci. Including the above case, turbid fluid with a varying amount of fibrin and infected with pneumococci was found four times post-mortem.

There was one instance of a typical "bread-and-butter" heart in a negro. In two of these cases there was an accompanying turbid effusion (pneumococcal) in the left pleura only,

one with it in the right only, and one in which there was a very thick deposit of "plastic lymph" on both sides. No pericardial friction was heard in any of the cases that recovered. No cases showed endocarditis.

Meningitis—The only example of this complication has already been briefly referred to under "onset." The first patient, aged 22, received some slight wounds of the face and one of the scalp in the left occipital region. He was admitted to 3rd Canadian General Hospital within 24 hours with "signs of bronchitis and meningitis." On examination of the wound of the scalp 3 cm. in length, no fracture of skull could be detected. The case was transferred to the Pneumonia Hut on the third day of disease and put under the care of Captain A. M. Yeates, who was in charge in the absence of the writer. He was rather irrational, restless and in a semi-conscious state, but on arousing he talked intelligently. He could not remember incidents of injury or illness. There were signs of consolidation of the right upper and middle lobes. No paralysis was made out, there was some stiffness of the neck; knee jerks were increased and ankle clonus was present. Captain Yeates, greatly to his credit, diagnosed meningitis as a complication of the pneumonia and not of the head wound direct. At 11.30 p.m. on the third day the patient suddenly became comatose. A spinal puncture was done and cloudy fluid under increased pressure obtained. A smear showed many polymorphs and gram positive diplococci with definite capsules. Death occurred two hours later. The temperature had varied between 104° and 101.6°. At the post-mortem grey hepatisation of the upper and middle lobes of the right lung was found.

There was no spreading cellulitis about the scalp wound, no gross injury to the pericranium, and no fracture of the skull. No lesions of the dura, pia-arachnoid, or brain could be attributed to the missile. There was a very diffuse purulent exudate of greyish yellow color, especially over the base and posterior half of the brain. The blood vessels in the enveloping membranes of the brain were injected and irregularly distributed pial ecchymoses were found.

Blood-culture after death was done in seven cases and yielded pneumococci five times. Streptococcus mucosus capsulatus was found once and in the remaining case the blood-culture was sterile.

It is with pleasure I express my thanks to the Nursing Sisters, Ward Masters and Nursing Orderlies who at one time or another were in the "Pneumonia Hut." One and all were untiring in their efforts. It was very hard

work for the Sisters at the best of times, and in the midst of the night air raids they kept at their post of danger and comforted the sick. This resumé of the work would have been impossible had they not so kindly copied temperature charts and helped in many ways. Cor-

poral Lunn of the Royal Engineers also did much in preparing chart records.

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SARCOMATOUS ABDOMINAL TESTICLE IN A HERMAPHRODITE

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THE occurrence of a sarcomatous testicle is none too common, a sarcomatous undescended testicle is still more uncommon. A sarcomatous undescended testicle in a hermaphrodite seems unusual enough to justify its being reported.

The subject, F. W., aged thirty-four, presented itself complaining of a rather large tumor in the lower abdomen. The individual was dressed like a man, looked like a man, had a man's voice, and came in company with his wife. When the latter had retired the patient at once informed us that he was not like other men physically. An examination revealed mammary glands normal for a male, a most rudimentary penis without a meatus, and the hair over the pubes was in a straight line transversely as is seen in a female. There were labiae majorae of a female, but the labiae minora were fused with the deeper tissues which closed what, on superficial inspection, looked like a normal vagina. There was the usual amount of hair about the external labia for a female. The urethra terminated in a meatus at the usual site of a female. There were no testes discernable.

The examination for the ailment complained of revealed an abdominal tumor situated medially and rising from the pubes to a point almost as high as the umbilicus. It was quite regular in outline, smooth to the feel and hard to the touch. It was not of the consistency of a normal pregnancy. It looked about like a fibroid of the uterus.

A provisional diagnosis of a sarcomatous undescended testicle of a fibroid uterus was made, with the former as the more likely. This was explained to the patient and an exploratory laparotomy was advised.

At operation the mass proved to be a very vascular tumor filling the pelvis and rising up as described above. It was widely and firmly adherent, so that at no stage was there the slightest prospect of ablation of the tumor.



Examination of the pelvis was impossible, though curiosity prompted a serious attempt at ascertaining what it contained. A fair sized section of the mass was removed for microscopic examination. The site bled very freely and had to be packed.

The microscopic examination proved the mass to be sarcoma of a testicle.

The patient was given Coley's serum. He left the hospital in two weeks and the serum was continued at home. The mass never reduced in size and death occurred in about three months. The patient was at a distant point in the country and no autopsy was done.

The case has been referred to as a hermaphrodite. Steele (1) says: "True hermaphroditism implies the presence of a testicle secreting

spermatozoa and of a functioning ovary in the same individual." Since there are at least two functions for both the ovary and the testicle, it would have to be determined which of these functions must be fulfilled in each case before the subject can be defined as a hermaphrodite. The functions consist of the production of the sex cell and the production of the internal secretion in each case. It is well argued by Swale Vincent (2) that the production of the spermatozoa is not the function that gives to the animal the qualities of the male. He is of the opinion that the essential thing is the internal secretion, that it not only produces the qualities which are assigned by all as those of a male, but that the internal secretion maintains these qualities. Bouin and Ancell are quoted by him to prove his contention.

Moreover, in the workaday experience of many physicians, a childless marriage has been proven to be due to the absence of spermatozoa in the husband. Albeit, he would be classed by the most critical scientist as a true male.

It seems to us, therefore, that the crucial test of a true hermaphrodite is whether the internal secretions of the ovary and testis are present. The presence or absence of spermatozoa and ova is of less importance.

Whether the person referred to in this article was a true hermaphrodite or not we are unable to say. There were unmistakable physical properties of both sexes present.

The most practical question which arises in this case is the one of the undescended testicle. Occasionally in the undoubted male an undescended testicle can not be at all readily placed in the scrotum by operation. What shall we do with it? If it is left in the abdomen is it likely to undergo sarcomatous degeneration? Grant, in discussing his case of sarcoma of the abdominal testicle, says: "There should be no question of the propriety and advisability of removing the testicle in early adult life in case only one testicle is misplaced, whether the testicle is in the inguinal canal or within the abdomen." Coley, in the discussion, said he had formerly doubted that an abdominal testicle was more likely to become malignant than a scrotal one, but that he had changed his mind. He goes on to say: "With regard to

the treatment of this condition, I do not agree with Bulkley, who advocates the removal of every abdominal ectopic testis unless double. In cases in which the testis does not descend before the age of puberty, it is possible in nearly every instance to bring the testicle down into the scrotum by Bevan's operation. In rare cases in which the testis cannot be brought down, I believe it is wiser to remove it rather than to place it in the peritoneal cavity."

It is interesting to speculate on the question of the possibility of transplanting a sex organ to a hermaphrodite and thus make the individual take on more of the characteristics of the one sex or the other. Mayo is quite right when he says that the cases where this could be done with benefit must be very rare.

In conclusion, the writer ventures the opinion that the problem of the abdominal testis is one of importance. In case only one organ is intra-peritoneal and it cannot be brought down into the scrotum, its ablation is advisable because of its liability to malignant change. In case of the hermaphrodite, or a normal male, with both testicles in the abdomen, unless these can be brought into a normal serotum they should be removed, and we suggest the subcutaneous injection of extract of the interstitial tissue of the testis, as was done experimentally by Bouin and Ancell.

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MODERN MEDICINE AND THE GENERAL PRACTITIONER*

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DURING the last year the writer has enjoyed opportunities to meet and discuss the problems which relate to modern medical education and to medical practice of to-day, with eminent physicians and surgeons of Great Britain and Canada. Apparently the problems which to-day concern the welfare of the medical profession and the general public are essentially the same in Great Britain, Canada and the United States. Because of our mutual interest in these problems I venture to address this association upon the subject of this paper.

The chief problem is intimately related to the question of how the knowledge possessed by modern medicine may be applied most efficiently and practically for the benefit of the general public. Necessarily the chief agent in this work is now and must always be the general practitioner of medicine.

Modern Medicine

Modern medicine may be defined as a broad and comprehensive field of learning which has been developed by scientific investigation. During the last fifty years the study and evolution of chemistry, physics, physiology and bacteriology and their clinical application in later years, has changed and broadened medicine from an art of observation and a collection of alleged facts based upon empiricism, to an applied science founded on laboratory and clinical investigation. This does not imply that medicine is now or that it ever may become an exact science, but by means of continued laboratory and clinical research the modern medicine of to-morrow will be characterized by greater learning and will be of more value to mankind than that of to-day.

Scientific methods of investigation in pathology and bacteriology have brought us the valuable knowledge we now have of infectious microorganisms, infectious disease, epidemi-

logy and immunology. Vast as is our knowledge of these subjects, we have only made a beginning in establishing the fundamental basis for further investigation in these important subjects. We have some understanding of the reaction excited by the infectious invading microorganism with the tissues of the host. We have some understanding of the life cycle of infectious microorganisms. We are able to detect and estimate the offensive and defensive substances in the blood and other tissues of the host. We are able to utilize the presence of specific agglutinins and precipitins and the Bordet phenomenon of complement deviation in diagnosis. We have a broad comprehension of the methods of transmission of infectious diseases from man to man and a corresponding knowledge of disease prevention. In the establishment of these scientific facts we have obtained possessions of specific antitoxic sera of inestimable value in the prevention and cure of diphtheria and tetanus. We have also secured antibody developing antisera and antigens of material curative value in dysentery, epidemic cerebro-spinal meningitis and type I pneumonia and of prophylactic value in typhoid and paratyphoid fevers, cholera, dysentery and plague.

Aseptic surgery is a product of exact scientific research. A thorough application of the principles of asepsis combined with technical skill and experience enables the surgeon to invade every part of the body with a resulting saving of life and invalidism. Modern operative surgery has been able to add to the knowledge of disease by the opportunity to visualize and study the living morbid anatomy of progressive disease.

The study of physiology and physiological chemistry has brought about a revision of the older anatomical conception of disease. While to-day we are still interested in the morbid anatomical lesion as to its etiology, nature, evolution and its modification by management and treatment, we have quite as much or a greater concern in the coincident functional disorder. That is, modern medicine has been and will

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continue to be occupied with the investigation and elaboration of methods by means of which we shall have an understanding of the function of organs and tissues and the nature and significance of the reciprocal relationship of morbid reactions. In other words, a study of pathological physiology is now recognized as of the greatest moment in modern medicine.

The study of normal and pathological physiology has given us a better understanding of animal growth and nutrition. An understanding of animal growth and general nutrition has involved a study of food values and especially of what has been properly termed a "balanced diet" with its contained essential vital constituents, the "vitamines." This has implied a study of metabolism embracing a knowledge of blood chemistry, the alkaline reserve of the body, the hydrogen ion content of the blood, the carbon dioxid tension of the alveolar air, kidney function, the function of the gastrointestinal tract and the auxiliary organs of digestion—the liver and pancreas, the function of and interrelations of the secretions of the ductless glands, and other normal and abnormal physiological processes.

Modern clinical medicine as an applied science embraces such a vast field of knowledge that it is beyond the powers of any individual to acquire the necessary learning, experience and technical skill to efficiently practice in the whole field of medicine. A recognition of this has led to the necessary specialization in medicine and the evolution of the internist, the surgeon and the other specialists in the narrow fields of medicine and surgery. This evolution in specialism has been coincident with the invention of instruments of precision and the elaboration of laboratory methods of physical and functional diagnosis which require such technical experience and skill in their application, that they are valueless to the general practitioner. By these means, diagnosis both physical and functional, gains in precision, and at the same time becomes more and more complex. We all recognize the enormous benefits which these modern methods of physical and functional diagnosis have brought to medicine and that their utilization will continue to bring us additional useful knowledge. But, these complicated methods of diagnosis are of use chiefly in investigation rather than in routine practice. A modification and simplification of some of them may enable the general practitioner to apply them in routine practice with profit to himself and the patient.

The General Practitioner

The general practitioner who is essentially the family physician, is the most important fac-

tor in the practice of medicine. In any plan which may be made for the improvement of medical practice, domiciliary visitation must be considered as a necessary fundamental prerequisite in the conservation of health and in the treatment of the sick and injured. It is fundamentally necessary that intimate relations must exist between the physician and the patient. This intimacy the family physician possesses.

If the general medical practitioner is to occupy the important position which modern medical practice demands, it will be necessary to rehabilitate him that he may be qualified to do his part of the work with due regard to efficient service, adequate financial reward, opportunities for social enjoyment and betterment of himself and family.

The first essential is the more sensible and practical education of the medical student. In the United States and I believe in Canada, too, there is need of a decided modification in the curriculum of the medical school. The present curriculum tends to specialism of the undergraduate medical student. As a result there are not a sufficient number of broadly trained general practitioners. The recent medical graduate lacking the necessary broad training in general medicine and inadequately trained in any given specialty, is nevertheless encouraged toward specialism and toward urban practice.

We may have a better conception of what the education and training of the undergraduate medical student should be if we will consider what are the obligations and responsibilities of the general practitioner to the community he serves. The family physician is responsible for the safe and sane treatment of the family in illness and injury, and it is his duty to preserve individual and community health. His general education must be broad inasmuch as he counsels and advises the family in regard to all problems which concern it in relation to individual and general hygiene, public sanitation, education, community obligations and responsibilities and their care in sickness and injury. Therefore, he must have a good general knowledge of the principles of epidemiology, immunology, sanitation, medical jurisprudence and sociology that he may act rationally when confronted with the problems which relate to the application of tried and proved measures of disease prevention for the protection and welfare of the multiplied families—the communities for whom he is responsible. He must advise, guide and safeguard the expectant mother through gestation. He must so manage the labor that it will terminate within a reasonable time, if

possible, without instrumental interference and without serious injury to the mother and child. He must be able to meet obstetric emergencies and especially to recognize serious complications at an early stage of labor so that consultation may be secured if he is alone not technically able fully to safeguard the two lives for which he has assumed responsibility. He must be able to give the best advice and management in the care of infants and children. This implies a practical knowledge of modern infant and child welfare work. He must understand the principles of psychology which will enable him to recognize psychopathologic conditions in childhood and in adult life. For abnormal mental conditions and their management and treatment he will usually not assume responsibility, but will be able to direct the related responsible individuals to physicians qualified in this work. He must be well trained in diagnostic methods and generally able to recognize existing morbid conditions by physical examinations and to apply simple functional tests. His long acquaintance with families will enable him to trace the beginning of pathologic changes and to apply the proper management and treatment while the condition is remediable.

He should know what management and treatment to give. If he has been properly trained and educated, he will command a selected few, tested and tried pharmacological products which he will be able to use with skill and usually with great benefit to the patient. His knowledge of the principles of immunology and bacteriology will enable him to apply recognized specific serums and a few antigenic vaccines with judgment and skill prophylactically and therapeutically. In the general management of his patients he will utilize rest, a proper environment, and, so far as available, physical treatment. Usually he will be able to command hydrotherapy, thermotherapy and occupational therapy and, in some instances, electro and masso therapy. He will have the proper conception of the value of calisthenic and other active exercises in the restoration of function of the heart, skeletal muscles and joints. He will understand asepsis and be able to perform minor and emergency surgery, and especially manage fracture of bones and uncomplicated joint dislocations with confidence and ability. He will know his own limitations and will safeguard the lives and health of his patients by reference of major surgical conditions, with which he is unable to cope, to qualified surgeons.

With this brief statement of the functions of the general practitioner, it is not necessary to enumerate the various steps which should be

taken in the training of the family practitioner. It is plain and evident that he must have a good knowledge of general and physiologic chemistry, of human anatomy and physiology, of pharmacology, of general pathology, including morbid anatomy, of epidemiology, immunology and psychology. In the clinical branches he must have the training of his brains, special senses and hands in recognition of disease. He must learn to use efficiently the simple diagnostic methods supplemented by instruments of precision and laboratory tests. He should have experience in the application of these methods of diagnosis by constant and daily study of disease as expressed in ambulatory and ward patients. He must have an opportunity to observe the etiologic relation of occupation, environment, social conditions and other factors to disease. He must learn and recognize the importance of community as well as individual disease. He must have the opportunity to observe the results of medical treatment and management and the final condition of the patient after operative surgery. He must have thorough training in the principles of asepsis and in the technic of operations upon the cadaver and lower animals; must witness minor surgical operations, and especially the emergency surgery, including that of practical training in the diagnosis and treatment of fractures of the bones and of dislocations of the joints. He should have practical training in medical jurisprudence. The training in pharmacology and toxicology should be supplemented in the clinical course by practical observations of the effects of drugs and poisons on patients. He must have an opportunity for the practical study of dietetics and dieto-therapy. He should have practical training in child welfare work and in the modern methods of infant feeding. His training in obstetrics should be practical and should include the prenatal and after-care of the mother and infant. He must have practical experience in the measures of disinfection of the sick room, of the excretions of the body and of other measures of control of the communicable diseases. If an interne year is a pre-requisite to graduation, the major part of this training should be mainly devoted to diagnostic methods, to the observation of the progress of disease and to the modification of the morbid process by management and treatment. The investigatory work conducted by the faculty and the staff of the hospital, which is a necessary part of the modern medical school, should produce a scientific hunger in the medical student which will be satisfied only by increased effort on his part to give the best that is in him to the work in hand. The bright and

energetic student may find an opportunity to apply himself to some form of elective investigative work with much benefit to himself. But the large majority of the medical class will be fully engaged in the routine work which this broad and necessary practical training demands.

The educational training, both academical and medical, does not fully qualify one to become an ideal family physician, for he must be a man of character whose daily life is a practical expression of honesty, morality and resourcefulness in service.

Post-graduate Training of the General Practitioner

The general practitioners already in the field are very much in need of short-term review courses in methods of laboratory and clinical diagnosis and in modern methods of treatment. The university medical schools and general hospitals should assume this responsibility and organize review courses especially adaptable to the general practitioner. If every university medical school will make this post-graduate review available to a small class of physicians two to more times each year, great benefit will be afforded the public and the medical profession. Medical alumni associations and medical societies should co-operate with the medical schools in this needed undertaking.

The Need of Improvement of Social Conditions to Attract Practitioners to Rural Districts

In many rural districts of the United States there is a lack of a sufficient number of practitioners of medicine to care for the sick and injured of the community. This is due to several factors, among which may be enumerated: Specialism in medicine and the attraction which the city offers the medical practitioner in opportunities to enjoy the comforts of modern life, professional advancement, close association with colleagues and other benefits; and, on the other hand, the lack of the necessary conveniences of modern life, of amusements, social and other, of good schools and other conditions which are demanded by the individual who has had the opportunity of a broad education. The average age of the practitioners in the rural districts in the United States is fifty or more years, an indication that graduates of recent years have settled in urban communities. It is necessary, therefore, that we shall not alone correct the methods of the training and education of medical students to better qualify them as general practitioners, but we must also attempt to improve the social conditions, including education, in rural districts, and at the same time must supply the

rural practitioner with facilities for the diagnosis and the treatment of his patients.

Of the various suggestions which have been made, for the improvement of the health and social condition of rural communities, brief mention is necessary of compulsory health insurance and of state medicine.

Compulsory Health Insurance

Health insurance has been and still is advocated by many social reformers of the United States as a panacea for all material and economic ailments of the public. A majority of the medical profession of the United States is opposed to it on the rational ground that it is class legislation which benefits the insured alone, tends to the moral and financial degradation of the medical profession, interferes with the patient in the selection of the individual physician, encourages inefficient medical practice and other evils not necessary to mention. It is the consensus of opinion of our best qualified citizens that health insurance is impractical and unsuited to the health and medical practice problems of the United States. Considerable confusion seems to exist in this country in regard to the actual results of health insurance as it is applied in Great Britain. Apparently it does not meet all of the health requirements of the people of the United Kingdom inasmuch as a committee appointed by the Ministry of Health is engaged in an investigation in regard to the establishment of health centres of which I shall speak later.

State Medicine

State medicine, which embodies more or less paternalistic health and medical care of the public, has its advocates with us. The dangers incident to bureaucracy and centralization of operation with consequent inefficiency, the danger of eradication of the family physician and the increased incidental Federal or State taxation are objections which are concurred in by the thinking portion of the public.

Community or Health Centres

Based upon facts established by experience that health and welfare measures which are really beneficial must be paid for and operated by the people of a community, there has been established by legislative action of several of the States of the Union, the statutory right for the organization of community or health centres of territorial districts comprising one or more wards, one or more townships or one or more counties.

The fundamental idea in the organization of a community centre is the improvement of the living, the social, the educational and the health conditions of the community, which shall be paid for by the voluntary direct and indirect taxation of the people and shall be operated by the people of the community themselves subject only to certain standards fixed by higher authority. The Federal and State government should encourage the organization of such community centres by making uniform standards of organization and operation of all centres within its borders, but give financial subsidies only to those communities which are so sparsely settled that preliminary financial aid is required in their establishment.

In the operation of these community centres the improvement of living, of social, of educational and of health conditions will be participated in by the medical profession, the churches, all other social betterment organizations, boards of education and the general public. The problem of the improvement of the health and the facilities for the treatment of the sick and injured is the chief one, and in this the initiative and the responsibility must be assumed by the medical profession. Every community of health centre will have its hospital for the care of the sick and injured and of the expectant mother, with facilities for the segregation and care of communicable and contagious diseases. In some centres there may be a main hospital with small branches at other locations in the district. The hospital will have its diagnostic centre with all the facilities for laboratory and physical diagnosis. Secondary diagnostic centres in lieu of branch hospitals may be located in various parts of a district. The superintendent and other personnel of the hospital and diagnostic centres may be appointed by a board of administration created by the people of the district. All medical and surgical treatment and other activities, including the inspection and physical training of school children and other health measures, are distinct responsibilities of the medical profession of the community centre. Every legally qualified practitioner of medicine within the district should be able to command the diagnostic facilities of the centre and the use of the hospital for the treatment of his patients subject to rational regulations formulated jointly by the superintendent of the hospital and the organized medical profession of the centre. Every legalized practitioner of the district will carry on his practice in his office, in the homes of his patients and in the hospital, at all times maintaining his individuality and the family intimacy which is so essential to efficient medical practice. The hospital would naturally be

the centre of community improvement and service. Its library composed of medical and health literature would be the meeting place of the organized medical profession and of other societies interested in the improvement of the living, the social and educational and the health conditions of the community. Suggestions for the organization and administration of community or health centres have been made recently by the writer.*

In Great Britain the need of available diagnostic and hospital facilities for the general practitioner of rural communities and small cities is evidenced by the report of the Consultative Council of Medical and Allied Services of the Ministry of Health of Great Britain.†

Next week at Boston at the annual meeting of the American Medical Association the Council on Health and Public Instruction will make a special report on this subject. Evidently a large number of the medical profession of Great Britain and the United States recognize the need of additional and adequate facilities for the diagnosis and treatment of the rural population by the general practitioner. I think it is equally essential to make rural living conditions attractive for the public good and to induce medical practitioners to select a country rather than a city practice.

Professional Relationships of the General Practitioner

I have attempted to show that the efficiency in service of the general practitioner is dependent in part upon his medical qualifications, his social and economic status and the existence of available diagnostic and therapeutic facilities at his disposal. I have discussed the methods by which these needed factors may be acquired or furnished to the general practitioner. It now remains to discuss his relationship with his fellow-general practitioners, with consultants, internists, general surgeons and the specialists in the narrower fields of medicine and surgery.

I think it will be recognized that the professional relationships of the general practitioner are very important factors in regard to efficiency of service and his economic status. With his fellow-general practitioners his relationship should be one characteristic of justice and fair dealing. This can best be brought about by the organization of the medical profession of a community into a society or association. So organized the medical profession will be able to wield a united influence in the promotion of the welfare of the lay public and for their own mutual benefit. Professional as-

sociation of this kind promotes friendship, respect and good-will. Frequent meetings for the consideration of professional topics is a means of professional advancement. The organized professional action as a unit may take the initiative in a constructive program, such as that suggested in the establishment of community centres and, furthermore, it lies entirely within the hands of the organized profession to dominate and to control the administration of programs which are put forward to benefit the general public by furnishing the medical profession of the community with facilities which will give opportunities for more efficient medical practice.

The relationship of the general practitioner with the members of the profession who specialize and with the internist and general surgeon is one of the greatest importance to the public and to the general practitioner. On the part of the consultant, general surgeon or specialist this relationship with the general practitioner should be characterized by a broad-minded, sympathetic and helpful attitude. The patient who depends upon the general practitioner for advice and care, who may be referred by him or who may without reference go to individual consultants or to groups of practitioners who are organized for private practice or who compose the staff and faculty of the medical school, should be fairly dealt with in regard to the efficiency of the examination and technical treatment indicated and then should be returned to the general practitioner with written information and advice which will enable him to carry on the future management and treatment of his patient. Every effort should be made by consultants in general to aid the general practitioner in his practice by sympathetic co-operation with him and with the uniform policy characterized by justice and fair dealing. It lies within the province of general and special consultants and of general surgeons to improve the standard of practice of the general practitioner. The errors of practice due to want of knowledge of the general practitioner which may be recognized by the general and special consultants, may be corrected without offense and a little time spent in instruction by the consultants will greatly aid in the avoidance of like errors in practice.

The internist and consultant has an opportunity to greatly improve the methods of diagnosis of the general practitioner. I have already noted that some of the complex methods of laboratory and clinical diagnosis which are of the greatest utility in investigatory work, are unfitted for routine clinical usages. The knowledge obtained of the physical and func-

tional conditions by these complicated methods of diagnosis, often may be reached, approximately by the application of available simpler methods. The internist must be held responsible for the needed simplifications of these methods of diagnosis which he should present to the general practitioner so phrased that he may understand and utilize them in his routine work. In this connection it is to be presumed that the general practitioner will be qualified and will use his brain, special senses and hands in the diagnosis of his patients. His training as a medical student or his post-graduate review training should impress upon him the need of a careful consideration and record of the history of his patients and this should include a careful setting down of the results of the examination made. He should be able to utilize the simpler laboratory chemical and microscopic tests of the urine, to make an estimate of the hemoglobin, to use the stethoscope with understanding, to apply when required, the much overvalued blood pressure instrument, to apply the simpler tests relating to the condition of the cerebro spinal nervous apparatus and especially to ascertain the presence or absence of the various reflexes and to make careful examination of the abdomen and pelvis. He will never neglect careful examination of the mouth and throat and to carefully note evidences of local, confined infection which may be related to the general condition of the patient.

If in addition to these always available methods of diagnosis, the practitioner may when necessary apply simplified tests of functional conditions, his knowledge of his patient will be greatly improved. For example, the practitioner may recognize that his patient suffers apparently from chronic nephritis as evidenced by albumin and casts in the urine. There may be an associated hyperarterial tension and hypertrophy of the left ventricle, all of which are recognized easily by the qualified general practitioner. These conditions are not sufficient in themselves to enable him to give a definite prognosis which is so important to the patient. If the environment of the physicians and the patient is such that no diagnostic centre is available, or if the patient's financial condition is such that he cannot afford to travel far for the needed accurate tests, the practitioner may utilize simple methods which will give valuable general information concerning the function of the diseased kidney. The kidney is an excretory organ which eliminates from the body water, salts, nitrogenous and other elements. It is a simple matter to ascertain the ability of the kidney to excrete water and the various salts. All that is necessary is

that the night urine shall be collected and measured for a period of twelve hours and the specific gravity thereof noted. During a fasting period of two or three hours in the morning, the patient may then be given two quarts of pure water. The urine of this period is separately collected each hour for four or five hours, measured and the specific gravity of each specimen noted. The patient is then given a liberal meal of mixed foods containing meat, and with a considerable amount of common salt as a condiment. For a period of four or five hours after this meal, the urine is collected and measured in hourly periods and the specific gravity noted. A comparison of the amount of urine voided in the three periods will give an indication of the ability of the kidney to excrete water. A comparison of the specific gravity of the urine in the three periods will indicate the ability of the kidney to concentrate and excrete the salts. If polyuria occur during and after the period of excessive water intake and if the urine collected in the afternoon after taking the hearty meal has a high specific gravity, or if the specific gravity of the urine of this period is notably higher than that of the night urine, then the practitioner may assume that the function of the kidney is fairly good. A reverse of these findings in the three observations indicated would signify a relatively bad function of the kidney. This knowledge, while not accurate enough for investigatory purposes, is after all sufficient to serve the practitioner in making a relatively good or a fairly accurate prognosis. In addition, this information may be utilized as a guide in the treatment of the patient.

In 1918 the writer visited the military heart centre at Colchester, England, which was under the direction and supervision of Dr. Thomas Lewis. It was interesting and instructive to witness the operation of this large clinic. Dr. Lewis utilized the simplest measures of diagnosis of the physical and functional condition of the heart in the investigation of the condition of the soldiers who had been sent to the centre for alleged morbid heart conditions. It was especially interesting to find that the man who had done so much in the investigation of heart conditions with the electrocardiograph had no use for this instrument in the routine work of the clinic. The clear and precise explanation of conditions of the heart which are now made understandable by the investigation made with the polygraph and the electrocardiograph may be commanded at a small price in the books written by Sir James MacKenzie, by Dr. Thomas Lewis and others. In addition to this literature, there should be added brief and clearly phrased description of

the most striking functional disturbances of the heart and how they may be recognized by the methods of examination always available to the general practitioner.

It is unnecessary to cite other examples of the utility of simplified new methods of physical and functional diagnosis which should be made available to the general practitioner. In this connection the members of the medical profession must recognize that investigatory methods in clinical medicine are necessary in the promotion of scientific accuracy and in the extension of this field of learning. Investigators are born, not made by training. Too often fallacious conclusions have been made by individuals unqualified to make scientific research. This unjustified wastage of time and money should not create a sentiment derogatory of such work; rather should it encourage the few qualified individuals to continue in this fruitful field of endeavor. But these favored few among us should ever bear in mind that all acquired accurate scientific knowledge should when possible be made available for practical routine application by the large majority of us who constitute the rank and file of the profession.

Finally it is necessary to say that the professional and economic status of the general practitioner is mainly dependent upon himself. If he is himself blessed with physical health and average mental capacity, he will find a way and means to keep abreast of medical progress. If he is qualified professionally and if he give conscientious and energetic service to the best of his ability, regardless of the time being of the degree of the financial reward he may receive, to any patient who consults him, he will not lack for patients and ultimately his financial reward will be satisfactorily large.

Perhaps I have been in error in presenting an essay of this character to this association. Conditions which confront the medical profession of the United States justify discussion of the involved topics. If the medical profession and the Canadian people enjoy a satisfactory condition of health regulation and medical practice which makes this discussion unnecessary, then I most heartily congratulate you and request that you unite in showing us, your cousins and friends, how we, too, may go and do likewise.

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BASAL METABOLISM AS A GUIDE IN THE SURGICAL TREATMENT OF GOITRE WITH HYPERTHYROIDISM*

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THE confidence of the medical practitioner in the surgical treatment of goitre with hyperthyroidism does not seem to have kept pace with the successes achieved. The fact that in the earlier years there was a rather large percentage of failures has overshadowed the real progress that has been made, and has stood in the way of a just appreciation of what modern surgery can do. While it must be frankly admitted that up to the present time from 25 per cent. to 35 per cent. of cases of Graves' disease and from 10 per cent. to 15 per cent. of cases of toxic adenoma of the thyroid have not been cured by operation, it can, nevertheless, safely be said that so far operation has given incomparably better results than has any other form of treatment.

The medical practitioner should not expect too much of surgery. It is a fallacy to assume that all surgical procedures are curative. The surgery of appendicitis has tended to develop the idea that a surgical operation which yields a result short of a complete cure must be classified as a failure.

In Graves' disease we have to deal with a condition involving many elements, of which thyroid hyperactivity is but one, though the foremost. In other words, Graves' disease is not an intrinsic disease of the thyroid gland, and the extirpation of the thyroid, with consequent suppression of that particular secretion which is responsible for the increased metabolism, does not necessarily ensure a recovery of the physiological balance of the other elements, endocrine and sympathetic, which are admittedly concerned in the development of the complete clinical syndrome. If, therefore, the operation is successful in abolishing the hyperthyroidism, but does not bring complete relief, the failure must be attributed to mal-adjustment of the extrinsic elements, to a permanently deranged sympathetic system, or to

the persistence of myocardial changes, all of which conditions antedated surgical treatment.

Toxic adenoma, on the other hand, is, so far as we know, an intrinsic disease of the thyroid gland, with symptoms referable only to its own activities. This assumption is very strongly supported by the rapid disappearance of all symptoms after extirpation of the focus of disturbance. The surgical failures in this group are due, as pointed out in a previous paper, to inadequate or delayed operation or to pre-existing myocarditis.

Physicians look dolefully upon the outcome of cases of Graves' disease, and there are internists who say that they have never seen a complete and permanent recovery. I hope to be able to show from the accompanying histories and metabolic charts that early surgical intervention in Graves' disease is not merely warranted, but indeed yields the most satisfactory results. If operation can be shown to be the best way of treating this disease, why should it not be undertaken early? Time will, I think, show that the surgical failures in Graves' disease are in direct proportion to the time which is allowed to elapse between the onset of symptoms and the operation. An analogy may be cited in the treatment of syphilis, where more prompt and more lasting results are obtained when treatment is begun with the detection of the primary lesion, instead of waiting, as was the practice in pre-salvarsan days, for the appearance of "secondaries." The "secondaries" in Graves' disease are the signs of toxic saturation—loss of weight and strength, pronounced exophthalmos, and myocardial changes.

At the present time the basal metabolic rate is unquestionably the only reliable index of the presence and degree of hyperthyroidism. Two other tests have in recent years been described as of value in the recognition of the state of hyperthyroidism—the epinephrin reaction described by Goetsch and the sugar tolerance test.

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Concerning the epinephrin test, the work of Peabody would seem to demonstrate its lack of specificity at least. The result of his observations may be briefly summarized in the statement, that there exists no relation between the intensity of the reaction to epinephrin and the severity of the hyperthyroidism. Furthermore, the epinephrin test was found to be positive in 14 per cent. of normal individuals; in 48 per cent. of those presenting the "effort syndrome"; in 50 per cent. of convalescents from influenza and pneumonia; in 47 per cent. of cases of questionable or definite tuberculosis; in a still larger percentage of psychoneurotics, and, finally, in individuals in whom the basal metabolic rate varied from minus 1 to minus 18.

With regard to the sugar tolerance test, the most that can be said is that intolerance seems to bear a definite relation to the degree of hyperthyroidism, as determined by the basal metabolic rate. That is not to say, however, that the hyperthyroidism *per se* is the cause of either diminished tolerance or delayed assimilation. We must remember that, in cases with high metabolic rates, there is rapid tissue waste; and it is reasonable to suppose that in such cases a degree of intolerance may easily be reached where absorption of sugar into the blood takes place not only from the gastro-intestinal tract, but also from the incorporated sugar reserves.

In the following reports the "basal rate" means the basal metabolic rate. All figures represent plus rates or percentages above normal.

The metabolic determinations have been made with the Benedict portable apparatus, under the personal supervision of Dr. Rabinowitch of the General Hospital staff. The uniformity of the results obtained is the best evidence that one can submit of the accuracy of this apparatus in the hands of an expert. It is very essential that it be kept in perfect working order and frequently tested out, and that every precaution should be taken against leakages, because the leakages bear entirely upon the oxygen consumed and not upon the carbon dioxide elimination. For this reason a comparatively slight leak may lead to a plus error of from 20 per cent. to 30 per cent. in the estimation of the basal rate.

The routine method of procedure for the primary determination is to take three observations of ten minutes each, at intervals of 15 minutes. The first observation is then discarded as being generally higher than normal, and the rate computed upon the average of the second and third observations. Subsequent rates are determined upon the average of two

observations of ten minutes each, with an interval of 15 minutes. These must agree within 1 per cent.; otherwise the test is thrown out and repeated at a later date. It is hardly necessary to say that all observations are made after a 15 hours' fast and after complete muscular rest for from 20 minutes to half an hour.

Although arranged in two groups, the first comprising seven cases of Graves' disease, and the second, five of toxic adenoma, these have not been selected, but represent consecutive studies upon the first twelve patients with hyperthyroidism treated under the control of basal metabolic determinations.

Group I.

Case 1.—Miss B., aged 20, referred by Dr. Lafleur. Graves' type without exophthalmos. The symptoms dated from June, 1920, and were attributed by the patient to a narrow escape from drowning one month previous. The goitre appeared three months after the symptoms, in September, 1920.

The basal metabolic rate, taken January 7, 1921, was found to be plus 34; the pulse, 114. Four days later the rate had risen to 36; the pulse to 116. Because of the patient's excellent physical condition and normal cerebral control, the absence of electro-cardiographic indications of myocarditis, and a basal rate well within the limits of safety, radical operation was considered justifiable, and was performed on January 15. The post-operative reaction was mild. On the following day the patient stated that the precordial thumping had ceased. By the tenth day the tremor of the hands had disappeared. On the 16th day after operation the basal rate was found to have fallen to plus 5, the pulse to 88. The patient was discharged on February 8th. A final metabolic observation made on April 4th showed that the rate was plus 4, the pulse 82. There were no residual symptoms.

In this case, as in all, the patient is to devote at least three months to convalescence before returning to her work.

The outcome of operation would appear to be a prompt and radical cure—a result not to be obtained by any other than surgical means.

Case 2.—Mrs. T., aged 39, referred by Dr. F. S. Swaine. Graves' type with pronounced exophthalmos. The goitre was discovered in September, 1920; the symptoms developed in October, 1920. There was no history of antecedent shock or infection.

The electro-cardiogram was negative. On January 16, 1921, the basal metabolic rate was found to be 76; the pulse, 112. On January 21, after a week's rest in bed, the basal rate

showed the usual fall of five points (71), and the pulse had fallen to 96. On February 2nd, after a further rest of nine days in bed, the metabolic rate was found to be the same, although the pulse had risen to 112.

As the basal rate had become stabilized and the maximum benefit from rest secured, ligation of the superior thyroid arteries was done on February 4th under local anaesthesia. This was followed by a moderately severe reaction. On February 21st, sixteen days after operation, the basal rate had fallen to 60, the pulse to 104. On February 27th a further decline in the basal rate was noted, from 60 to 55, but the pulse had increased to 108. On March 6th the rate was again found to be 55, with a decline in the pulse to 96.

As the basal rate had evidently again become stabilized and the patient showed excellent cerebral control, and there had been no further loss of weight, radical operation was considered to be safe. On March 11, 1921, subtotal excision of the thyroid was done. The reaction was moderately severe. On March 15th the basal rate was found to have fallen to 38; the pulse to have risen from 96 to 110. The patient was discharged on March 23rd, to continue her convalescence in the country.

On April 13th the metabolic rate was found to be plus 9, the pulse 84. However, no diminution in the exophthalmos was noted.

On May 11th the patient again returned for examination. The basal rate proved to be plus 1; the pulse, 78. The weight was 112½, a gain of 15 pounds.

In this case, as in Case 1, the precordial thumping disappeared within 24 hours after thyroideectomy. The satisfactory results in both patients are to be ascribed to the comparatively early extirpation of the thyroid and the absence of myocardial changes.

While the pulse rate during the time that the patient was under treatment in hospital conformed in a general way to the basal rate, there was on more than one occasion a rise in the pulse rate while the metabolic rate registered a decline. These variations between the pulse rate and the basal metabolic rate are most commonly met with in Graves' disease, and prove that the basal rate is a more stable index of the degree of thyroid hypersecretion than is the pulse.

Case 3.—Miss O., aged 28, referred by Dr. Pennoyer. Graves' type, without ocular signs. The symptoms dated from June, 1920, and were attributed to shock from the sudden death of the patient's mother three months previously. The goitre was not observed until the patient consulted Dr. Pennoyer in July, 1920, at least one month after the onset of symptoms. The

patient gave a history of severe toxic symptoms in July and August, 1920—vomiting, oedema of the legs, and the loss of 15 pounds in weight. Throughout August, September and October, and for the greater part of November, 1920, she had been continuously confined to bed, and underwent three courses of x-ray treatment. No marked improvement, apart from a gain in weight, resulted from either the rest or the x-rays. Latterly the nervousness and palpitation had increased.

On February 12th, after two days' rest in hospital, the basal rate was found to be 42; the pulse, 112. There were no unfavorable features in the physical examination, but the history of oedema suggested the possibility of myocardial changes. The electro-cardiogram showed the presence of left ventricular preponderance. On February 16th the basal rate had risen to 45. This rise, with the patient in bed, suggested that she was entering upon a period of increased hypersecretion, and for this reason operation was delayed. On February 21st, after 11 days' rest in bed, the rate showed a still further rise, to 52, while the pulse remained at 112. This rise in the basal rate was looked upon not only as a confirmation of the supposition that the patient was entering upon a period of exacerbation, but as an indication that a ligation should be done instead of a radical thyroidectomy. This was carried out on February 23rd, under local anaesthesia, and was followed by a moderately severe reaction. On February 27th the basal rate was found to be 34, the pulse 96. On March 5th, ten days after ligation, the basal rate showed a rise of one point, to 35.

On March 14th subtotal thyroidectomy was performed. The operation was rendered much more difficult by the presence of adhesions, the result of x-ray treatment. The reaction was moderately severe. Five days after operation the basal rate had dropped to 30; the pulse to 88. On March 25th, just before discharge, the basal rate was 25, though the pulse had risen from 88 to 100.

On April 22, 1921, the patient reported for examination and metabolic observation. Her general health had markedly improved, so much so that she was disinclined to adhere rigidly to the prescribed rest. The weight was 144, as compared with 136½ on discharge three weeks previously. The basal rate was found to be 16; the pulse, 88.

On May 3rd the patient was again seen. There had been a further gain in weight, with marked improvement in her feeling of well being. The basal rate was found to be plus 9; the pulse, 80.

The case is instructive in showing the value

of repeated observations in deciding whether the patient is approaching or receding from a peak of thyroid hypersecretion, and in furnishing a guide to the form of operation which may be safely undertaken.

Case 4.—Mrs. LaB., aged 26, factory hand, referred by Dr. Grant Campbell. Graves' type with ocular signs. The goitre was first noticed in March, 1920, and was followed in November by symptoms of nervousness and palpitation, which were attributed to worry over the loss of her husband two years previously.

This patient was admitted to hospital on January 20, 1921, showing signs of very severe thyroid intoxication—extreme nervous excitability, restlessness, tremor, incoherent speech, lack of cerebral control, deep flushing of the face, and sweating. The electro-cardiogram showed no myocardial changes. The lack of cerebral control was shown by pronounced unreasonableness, the patient getting out of bed as soon as the nurse's back was turned, and removing the ice bags from her neck and chest. Until February 5th, although repeated attempts were made, it was impossible to secure sufficient co-operation on the part of the patient to permit of an accurate estimation of the basal rate. On that date, however, the rate was found to be 96; the pulse, 128. On February 13th the rate was 94; the pulse, 120. On February 21st the rate was still 94; the pulse, 116. The patient was showing better control and could be kept absolutely at rest in bed. On February 28th the rate had fallen to 85, although the pulse showed a rise from 116 to 126. At this juncture it was thought that ligation would be safe, but permission for such an operation was obtained only on condition that the patient should be allowed to go out for 24 hours to arrange some personal affairs. Leave of absence was granted on March 12th. On the following day the patient returned in a very excited state, with oedema of the ankles. She was returned to bed and ice bags were re-applied. At the end of 48 hours the basal rate was taken and found to be 100; the pulse, 122. After a further lapse of eight days, the basal rate was 98, the pulse, 146.

On March 25th ligation of the superior thyroids was done. The patient was extremely apprehensive when she came to the operating room, and, as nitrous oxide failed to induce anaesthesia, a small amount of ether was introduced into the circuit, and the neck injected with novocain. Bipolar ligation was rapidly performed. The reaction from operation was not as severe as had been feared. Within 24 hours a marked improvement in cerebral control was noted, with the disappearance of the congestion of the face. The change in the pa-

tient's mental attitude was as obvious to herself as to her attendants.

On April 3rd the rate showed a decline of 26 points, from 98 to 72, and the pulse had dropped from 146 to 122. On May 2nd the basal rate was found to be 42, the pulse 110. There was a marked improvement in all the symptoms, and, whereas before ligation the patient was firmly opposed to surgical interference, she is now willing and anxious that the second operation should be performed.

This case illustrates the fact that preliminary ligation may within a comparatively short time lower the basal metabolism to a point where radical operation may safely be undertaken. In fact, one is inclined to say that, generally speaking, a proportionately greater benefit is to be derived from ligation in cases with high basal metabolic rates than in those in which the toxæmia, as measured by metabolism, is of a mild grade. In other words, in cases of Graves' disease, where the basal rate is persistently below 50, other factors being favorable, one could not hope to secure very marked or lasting benefit from preliminary ligation.

Case 5.—Mr. S., aged 48, referred by Dr. R. W. Adams, Newport Centre, Vt. Graves' type, with beginning exophthalmos. The symptoms dated from mid-September, 1920. The presence of goitre was noted early in January, 1921. The patient had had a severe attack of influenza in May, 1920, and had not been able to work since. There had been a loss of 15 pounds in weight since the onset of the symptoms.

All of the usual signs and symptoms of Graves' disease were well marked, except nervousness, restlessness, and lack of cerebral control. The basal rate, taken on February 27th, was found to be 82; the pulse, 124. On March 4th, after five days' rest in bed and the application of ice bags, the rate had fallen to 70, the pulse to 102. On March 8th bipolar ligation was performed under local anaesthesia. The reaction was slight. Three days later the metabolic observation showed a post-operative rise to 76, without, however, an accompanying acceleration of the pulse rate. On March 17th, nine days after operation, the basal rate had fallen to 61, while the pulse remained at the former level of 100. The patient was discharged on March 18th, with instructions to report at the end of six weeks for further observation.

Although the patient showed severe toxæmia with loss of weight and strength, the complete absence of cerebral instability rendered the prognosis much more favorable.

An interesting feature in this connection was the peculiar susceptibility to emotional influ-

ences. If one spoke sympathetically to the patient, he would immediately begin to cry. Otherwise, apart from pronounced tremor of the hands, he exhibited none of the nervous manifestations of Graves' disease.

Case 6.—Mrs. LaS., aged 28, admitted to hospital March 9, 1921. The goitre had been present for two years; the symptoms had developed one year later. Distinct Graves' type, without ocular signs or symptoms of nutritional impairment—a case in which one would expect to meet with a low basal rate, were it not for the rapid pulse and local signs of thyroid hyperactivity, namely, pronounced enlargement, pulsation, thrill, and bruit.

On March 11th, after two days' rest in bed and the application of ice, the basal rate was found to be 75; the pulse, 130. On March 15th, after four days more in bed, the rate had fallen to 52, the pulse to 120. On March 18th ligation of the superior thyroid arteries was performed under local anaesthesia. The operation was followed by little or no reaction. The basal rate showed four days later a decline of 14 points, from 52 to 38, with a fall in the pulse to 106. During the last week of March a distinct increase in the size of the thyroid gland was observed, and increased activity was assumed, although the pulse continued to fall. On April 2nd the basal rate was found to have risen to 58. On April 5th a distinct recession in the size of the thyroid gland was noted, and on April 12th the basal rate was down to 56. The pulse rate had, however, risen to 116. Three days later, because of the marked decrease in the size of the gland, the rate was again taken, and was found to be 48, a fall of eight points. The pulse remained steady at 116.

On April 22nd subtotal thyroidectomy was performed under nitrous-oxide-oxygen anaesthesia. The anaesthetic proved unsatisfactory, inasmuch as it was found impossible to maintain the patient's color, and towards the conclusion of the operation the pulse became very rapid. This, I am convinced, was due to cardiac asphyxiation. During the 24 hours following operation the pulse rate varied between 160 and 180, and its volume was only maintained by rectal and subcutaneous salines. Twenty-two hours after operation the patient's condition appeared to be critical, but was promptly relieved by an intravenous injection of 700 cc. of 10 per cent. Gum Arabic. From this time on convalescence was rapid.

The febrile reaction from operation was but slight, nor was there any marked exacerbation in the nervous phenomena. In fact, it appeared quite evident that the post-operative crisis was due entirely to the anaesthetic. The patient's

own statement was that the gas frightened her, and she regretted that she had asked that a general anaesthetic should be used rather than local.

On April 29th, one week after operation, the basal rate had fallen to 12, the pulse to 98. By May 4th the hyperthyroidism had been practically abolished, the basal rate being plus 4 and the pulse 82. At this latter date the tremor, too, had disappeared. The patient presented a most radical change in her appearance, and was enjoying a feeling of well-being which she had not known for months.

This case illustrates very beautifully the close parallelism between the metabolic rate and the pulse rate. This is especially to be looked for in individuals in whom the toxæmia is not severe or of long standing, where there is good cerebral control, and where myocardial changes have not taken place.

Case 7.—Mrs. V., aged 30, referred by Dr. C. F. Wylde. Graves' type without ocular signs. Admitted to hospital March 14th, 1921. The symptoms dated from January, 1920, but the goitre did not appear until September, 1920. There was no history of antecedent nervous shock or infection. There had been no loss of weight or strength.

Three days after admission the basal rate was found to be 32, the pulse 108. On March 21st a subtotal thyroidectomy was performed. The operation was followed by a moderately severe reaction. On March 25th the basal rate was 52, the pulse 120. On April 2nd the rate was found to have fallen to 19, the pulse to 98. On April 10th the readings were 16 and 98, respectively.

This chart also shows the close parallelism between the pulse rate and the metabolic rate. In this case, as in Case 1, one would expect rapid disappearance of the hyperthyroidism on account of the moderate grade of the intoxication and the absence of myocardial changes.

Group II.

Case 8.—Miss M., aged 45. Toxic adenoma. This patient was admitted to hospital on January 17th, 1921, with a history of goitre dating back 16 years; symptoms of hyperthyroidism for the past 10 months; a loss of 12 pounds in weight during the past eight months; and loss of strength, with quadriceps weakness.

X-ray examination showed the presence of a homogeneous shadow in the retrosternal region, reaching to the level of the aortic arch, with a narrowing of the trachea at the upper outlet of the thorax. Apart from palpitation and precordial thumping, there was no evidence of cardiac disease. The basal rate, taken

January 3rd, prior to admission, was found to be 22, the pulse 90.

On January 20th, 1921, subtotal thyroidectomy was performed under local anaesthesia. The patient made an uneventful recovery, and was discharged on January 31st.

On March 13th she reported for observation. The basal rate was found to be plus 5, the pulse 84. She had resumed her duties as office clerk on March 1st. On April 27th she reported a gain in weight of 13 lbs. and stated that she had not felt so well for years.

This is a typical example of the result to be expected from operation in cases of this kind.

Case 9.—Mrs. K., aged 46, referred by Dr. C. A. Peters. Admitted to hospital February 8th, 1921, with a history of symptoms dating from February, 1920, attributed to the sudden and tragic death of her husband in March, 1919. The enlargement of the neck had been noted about a year before the symptoms developed. There had been a loss of 17 pounds in weight during the past year, but no loss of strength. Several long periods of rest in bed during 1920, after the first appearance of the symptoms, had failed to effect any permanent improvement.

The patient was extremely nervous and restless, and utterly lacking in mental control. There was marked tremor of the hands. The average pulse rate was 106. The electro-cardiogram did not show any evidence of myocardial change.

Two days after admission the basal rate was estimated to be 38, the pulse 108.

On February 15th subtotal thyroidectomy was performed under local anaesthesia. The operation was followed by a very severe reaction, which lasted for 72 hours. Subsequently, however, convalescence was uneventful. On February 25th, ten days after operation, the basal rate was plus 1 and the pulse 80.

On April 27th the patient reported a gain of 18 pounds in weight, and on May 4th a further gain of two pounds.

Case 10.—Miss P., aged 52, referred by Dr. Dunstan Gray. Admitted to hospital February 20th, 1921, with a history of goitre of 32 years' standing, and symptoms of hyperthyroidism for the past seven months, during which time there had been a loss of 26 pounds in weight, palpitation, precordial thumping, tremor of the lips and hands, and pronounced nervousness.

The goitre was of the colloid cystic type, with a large calcareous nodule in the right lobe. The x-ray showed marked displacement of the trachea to the right, with compression. The electro-cardiogram showed the presence of slight left ventricular preponderance. On February

27th, two days after admission, the basal rate was found to be 38; the pulse, 80.

On March 3rd, under local anaesthesia, subtotal extirpation of the thyroid was performed. This was followed by a moderately severe reaction, recorded three days later in the basal rate, which showed a rise to 58, the pulse showing a parallel rise to 100. From this time on, however, convalescence was uneventful.

On March 9th, six days after operation, the basal rate was 25, the pulse 76. On March 15th the readings remained the same. The patient was discharged on March 16th. She returned on April 6th, very greatly improved, with a gain in weight and a decline in the basal rate to plus 4.

Case 11.—Mrs. H., aged 48, referred by Dr. G. T. Griffith, with a history of periodic attacks of subacute thyroid intoxication during the preceding five years. The enlargement of the neck was first noticed in December, 1920. There had been a loss of 20 pounds in weight during the past eight months, with tremor of the lips, tongue and hands, and palpitation and nocturnal thumping. The goitre was small and definitely of the nodular type.

On admission, March 11th, the basal rate was 45; the pulse, 108. On March 15th, after four days' rest in bed, the basal rate had risen to 50, but the pulse had fallen to 96. On March 17th subtotal extirpation of the thyroid was performed under local anaesthesia. The reaction was moderately severe. Convalescence was uneventful, and on March 25th the basal rate proved to be 17—a decline of 33 points; the pulse was 90. On April 2nd the basal rate was plus 6; the pulse still 90. On April 10th, the date of discharge, the basal rate was plus 4, and the pulse 86.

Case 12.—Miss W., aged 42, referred by Dr. A. T. Bazin. Admitted to hospital April 2nd, 1921, with a history of goitre of 14 years' standing and symptoms of hyperthyroidism recurring at intervals during the past seven years. During the periods of exacerbation the symptoms referable to the heart had dominated the picture. One month prior to admission, while returning from the Southern States, the patient had had to be removed from the train to the hospital at Covington, because of alarming cardiac symptoms, precipitated by an attack of train sickness.

Examination showed well marked symptoms of hyperthyroidism—nervousness, tremor, rapid pulse, and precordial thumping. The goitre was small but distinctly nodular. The pulse was 120. In addition to hypertrophy and the presence of a basal systolic murmur there was definite evidence of myocardial changes, as shown by the electro-cardiogram.

On April 3rd the basal rate was found to be 39; the pulse, 120. On April 10th, after one week's rest in bed, the basal rate showed a decline to 22. On April 11th subtotal thyroidectomy was performed under local anaesthesia. The post-operative reaction was milder than one would have expected in view of the myocardial changes. On April 21st the basal rate was found to have fallen to plus 4; the pulse to 72. The patient was discharged on April 25th, completely relieved of the distressing cardiac symptoms.

Summary

In the Graves' cases the average age of the patients was 32 years; the average duration of the goitre, eight months; and the average duration of the symptoms, seven months; whereas in the cases of toxic adenoma these figures were, respectively, 46½ years, 12½ years, and 3 years.

In the differentiation of these two conditions the most striking point is the difference in the period elapsing between the appearance of the goitre and the onset of symptoms, which in Graves' disease is, on an average, about three months, and in toxic adenoma from 12 to 18 years.

Of the local manifestations it should be noted that a thyroid bruit was present in all of the cases of Graves' disease, and a palpable thrill in three out of the seven cases, whereas in none of the cases of toxic adenoma was either bruit or thrill noted. Again, in three out of the seven cases of Graves' disease ocular signs were present, whereas they were conspicuous by their absence in all of the cases of toxic adenoma.

The cases of Graves' diseases reported appear to confirm the belief that mental shock and acute infections are causative factors in the development of hyperthyroidism. To cite one instance in each category: In Case 1 the symptoms developed within one month of a narrow escape from drowning, and in Case 5 they dated from an attack of influenza.

In the history of the illness, the occurrence of oedema of the legs should be accepted as a warning of the possible existence of myocardial changes which may be undetectable by stethoscopic examination. In such cases radical procedures should be undertaken only if the basal metabolic rate is well within the limits of safety, because severe post-operative reactions, especially cardiac manifestations, are the rule.

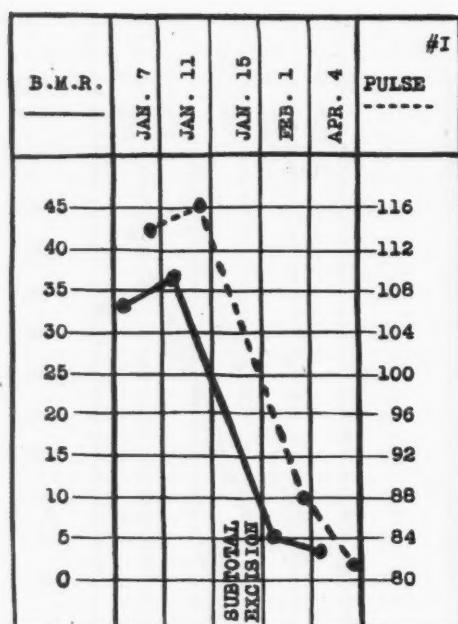
Such signs as quadriceps weakness, loss of the power of convergence (Moebius' sign), the absence of wrinkling of the forehead when looking upward (Joffroy), and lagging of the

upper lid in downward movements of the eye (Graefe), are probably due to one and the same cause, namely, the selective action of the thyroid toxin upon the muscles concerned. This belief was substantiated by the observation made in the case of one patient (seen with Dr. E. Archibald of Montreal), who had been confined to bed for some months, that pressure of the forefinger upon the tibia, with the knee flexed at a right angle, was sufficient, owing to quadriceps weakness, to prevent extension of the leg, whereas in the same patient the pressure of the finger upon the dorsum of the hand, when in plantar flexion, was readily overcome by the action of the extensors of the wrist and hand.

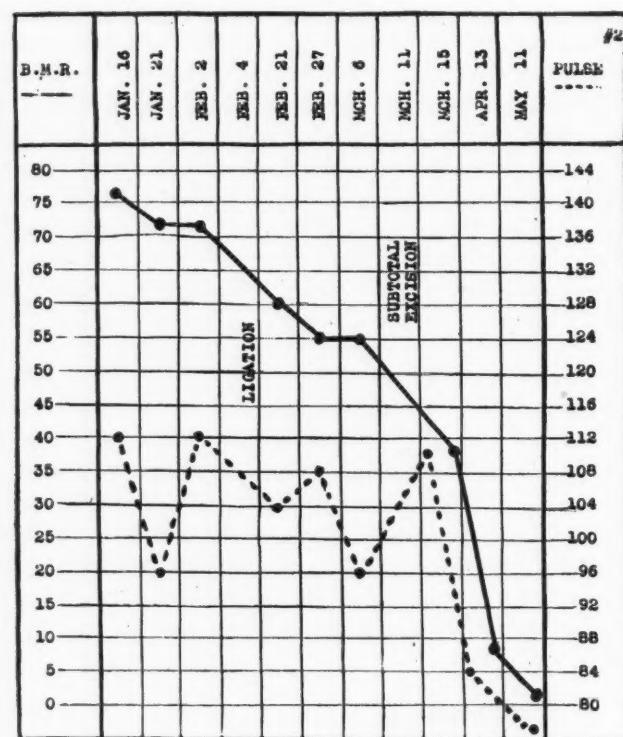
In Case 4, in which Joffroy's sign was most pronounced during the period of excessive intoxication, wrinkling of the forehead reappeared to a slight degree with the fall of the basal rate from 98 to 72, and was fully re-established with a further decline to 42. In Case 5 Graefe's sign, which was pronounced when the basal rate was 82, could only occasionally be demonstrated after ligation and the falling of the rate to 62. In the same way a progressive return of the power of one or both internal recti muscles is noted with the gradual disappearance of the toxæmia.

Stress has been laid upon the basal metabolic rate as an index of the degree of intoxication, as a guide to the time and extent of operation, and as an accurate means of estimating the effect of treatment. It must not, however, be assumed that the basal metabolic rate is the only guide. Familiarity with the patient's general condition is of the utmost importance. The pulse rate in general parallels the basal metabolic rate, and to that extent is a fair guide to the operative risk. When the nervous system bears the brunt of the intoxication, a wide margin must be allowed for post-operative reaction. The existence of long-standing cerebral irritation implies the exhaustion of nerve energy, possibly in many cases the partial disintegration of the nuclei of the cerebral cortical cells, and such subjects are ill-conditioned to stand the shock of operation, however perfect the technique.

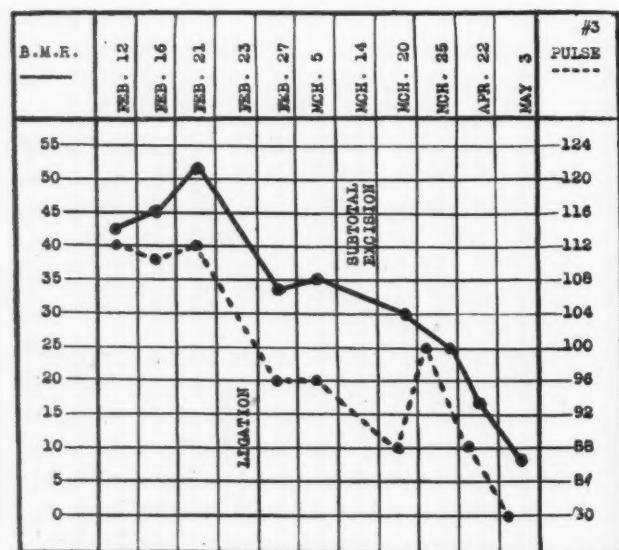
The question of anaesthesia would appear to be mainly one of personal choice and experience. In some of the larger clinics nitrous-oxide-oxygen is the anaesthetic of choice; in others, open ether. My own preference is for local analgesia. All of the operations in this series were done under local analgesia, with the exception of the ligation in Case 4, in which gas-ether combined with local infiltration was employed, and the excision in Case 6, which was done under nit-



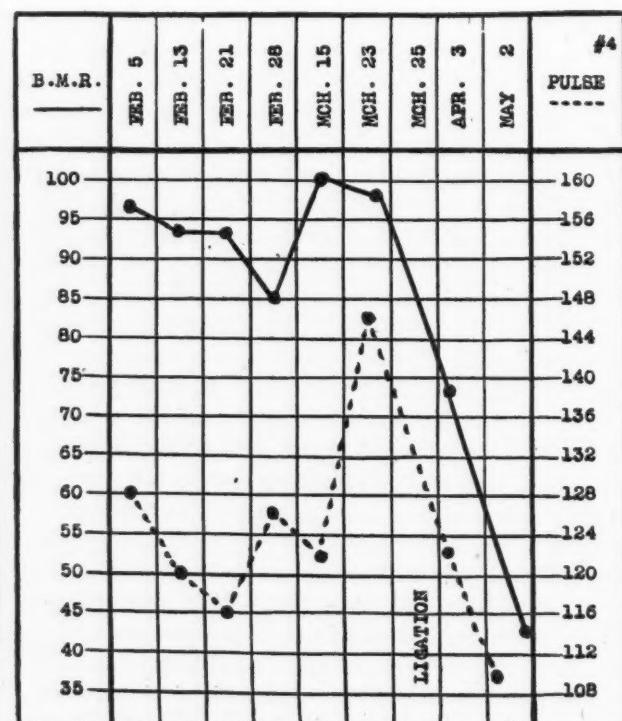
Case No. 1



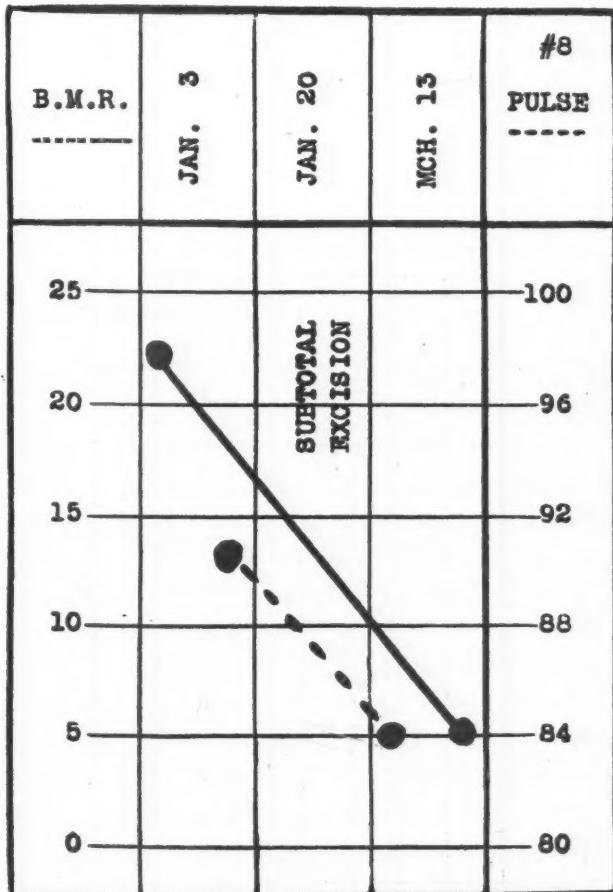
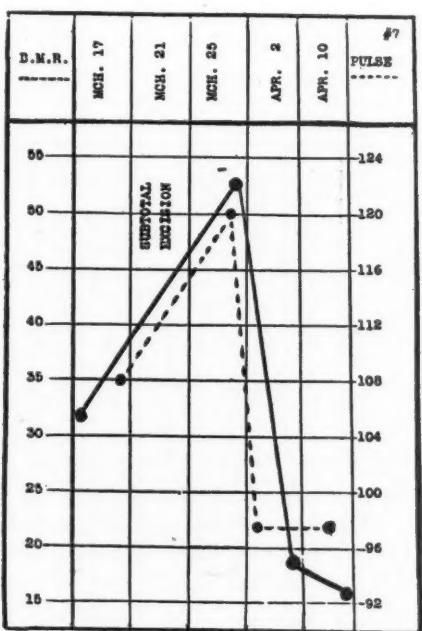
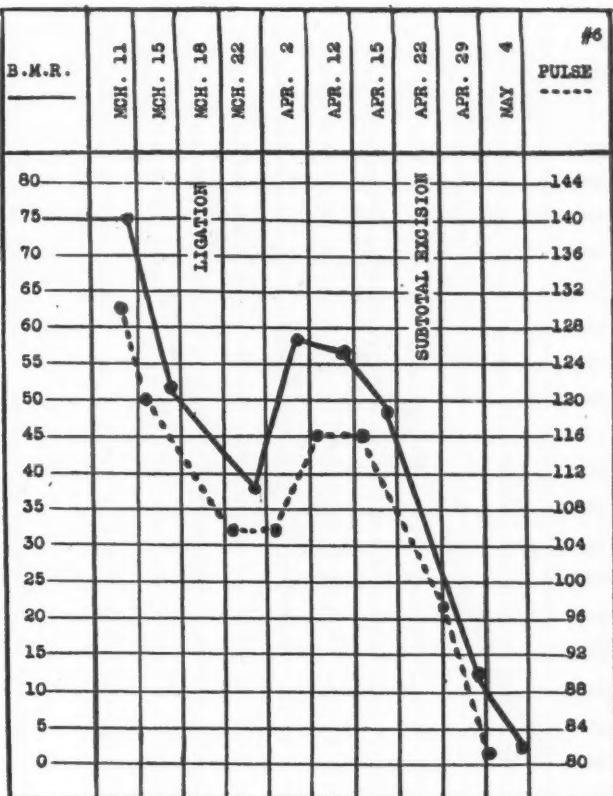
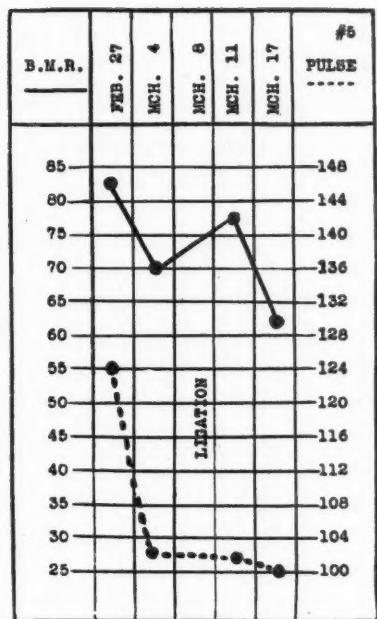
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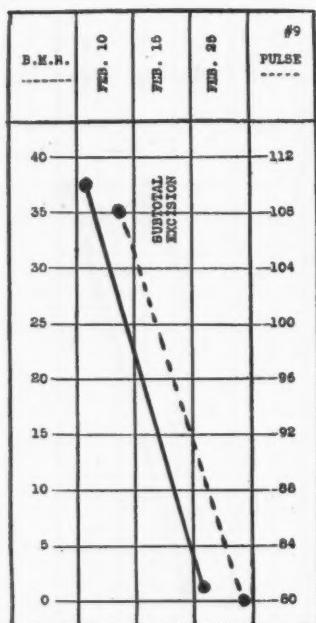


Case No. 3

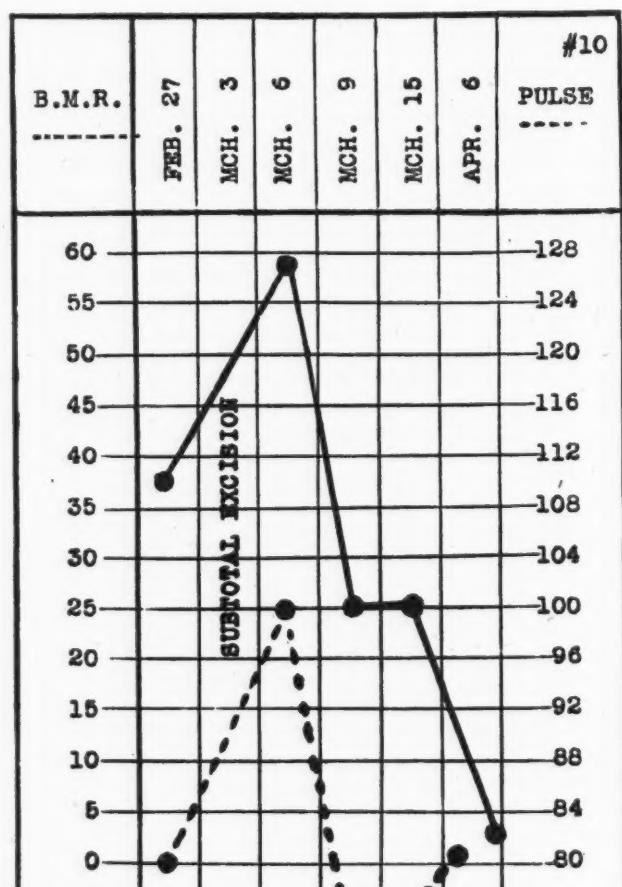


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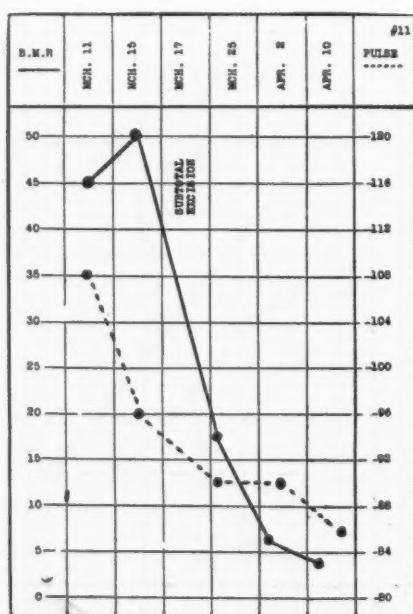




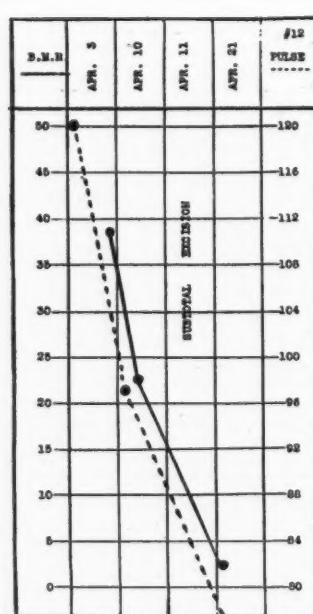
Case No. 9



Case No. 10



Case No. 11



Case No. 12

rous-oxide-oxygen anaesthesia and local infiltration. In the former case, owing to the patient's utter lack of control, the use of local anaesthesia alone was out of the question, and in the latter, as noted in the case report, the use of nitrous-oxide-oxygen proved unsatisfactory. In my experience vomiting is an invariable sequence of operation upon the thyroid, no matter what anaesthetic is used.

In the use of local analgesia the attendance of a nurse capable of engaging the attention of the patient is a tremendous advantage. To meet this need, and to eliminate excitement of the patient by contact with strangers, arrangements have been made in the clinic for the surgical nurse in charge of the thyroid patients to accompany them to the operating room, to minister to their comfort by fanning, applying cold water to the lips, etc., and to maintain their mental tranquillity. This provision is destined to prove a valuable adjuvant in the handling of these cases.

The routine practice after operation is to administer a hypodermic injection of morphine gr. $\frac{1}{4}$ and atropine gr. $1/150$, as soon as the patient complains of pain. This may be repeated every six hours, if necessary. In addition, ice bags, from four to twelve in number, are placed beside the thorax, flanks, and thighs, and rectal salines, 6 oz. every four hours, are given until the patient is able to take by mouth the requisite amount of fluids. Where it is necessary to promote renal action still further,

subcutaneous and (in extreme cases) intravenous salines may be administered.

Drainage of the wound is employed in all cases for 24 hours, not only to provide for the evacuation of blood, but also to liberate thyroid juices which might otherwise be absorbed. Dressings should be done daily, to forestall the possible collection of serum, and a director should be passed if there be any bulging or fluctuation at the point of drainage. The stitches are removed on the second or third day.

Early in the convalescence a bitter tonic is given before food, and, where the indications exist, an iron tonic after food.

One would again call attention to the rapid decline in the thyroid hypersecretion after subtotal thyroideectomy. This prompt elimination of the chief factor in Graves' disease will undoubtedly lead to a permanent cure, if operation be performed before toxic saturation is reached, with its consequent excitation of other glandular secretions and the derangement of the sympathetic system—factors which, with our present knowledge, can not be brought into subjection as can the secretion of the thyroid gland, and which are responsible for the perpetuation of symptoms which can not be ascribed to hyperthyroidism.

In conclusion I would like to express my thanks to the different members of the Attending and Resident Staff, to whose close co-operation are due the uniformly favorable results which have been achieved.

Roentgen Ray and Tuberculosis in Infants and Children

As a result of a statistical study of forty-four infants and children at the Boston Consumptives' Hospital, Frederick W. O'Brien and Forrest B. Ames, Boston (Journal A. M. A., May 28, 1921) found that: 1. (a) The von Pirquet and intracutaneous skin reactions are reliable guides to infection with tubercle bacilli, and the number of positive reactions increase from infancy up through childhood, over 10 years of age, all patients reacting. (b) In twenty-six of thirty-six positive skin reactions, the roentgen ray disclosed the site of infection to be intrathoracic.

2. D'Espine's signs as a clinical index of tuberculosis of the bronchial lymph nodes is of relatively little value, being elicited only eleven times, as against roentgen-ray evidence of glandular enlargement in twenty-eight cases.

3. Three cases of positive sputum were found in fourteen diagnoses of chronic pulmonary tuberculosis.

4. Fourteen cases of chronic pulmonary tuberculosis of the adult type were found. This suggests that the so-called phthisis is more common in children than has been stated by writers of text books.

5. Fifteen cases, negative clinically, showed definite roentgen-ray signs of marked structural changes consistent with tuberculous infection. This raises the question as to whether these children are to be regarded as more likely to develop clinical tuberculosis and should thus be watched carefully and roentgenographed at fairly frequent intervals.

FUNCTION OF AN INFECTIOUS DISEASE HOSPITAL

D. L. RICHARDSON, M.D.

Providence, R.I.

IT is not customary for scientific men to become eloquent upon matters which concern their own field of endeavor. The public becomes acquainted with their achievements by the slow process of education. But it does seem a pity that more advertising methods cannot be used in education upon the subject of sickness and death. Nothing is dearer to any human being than good health and the reasonable assurance of the three score years and ten. Surely the public wishes to know of the prevalence of disease and death and are willing to expend unlimited amounts of money on measures which experience has proved to be of service in saving lives. If during the year 1918, 490,000 men and women had died in the United States in the service of their country, orators would have loosened their silvery tongues, and the press would have devoted large space to their lives and deeds. But no, they only sickened and died of the most common infectious diseases. If, in the year 1919, 21,000 Canadians had fallen on the battlefield, your countrymen would have known it even in the most remote hamlet; but no, they only perished from these same diseases. Both war and infectious diseases are theoretically preventable, and while in actual practice both are difficult to control, every possible means should be utilized to bring to the lowest point the loss of life from these causes.

In Canada during the year 1919, according to the Registrar-General at Ottawa, 20,921 persons died of the most common of the infectious diseases. The number of deaths from each disease is found in the first column of the table which follows, and this table also includes a column which shows the probable prevalence of each disease enumerated:

	Deaths	Prob- able case fatality	Estimated number of cases
Influenza	15,590		
Pneumonia	2,382	2%	903,100
Broncho-pneumonia	91		
Scarlet fever	325	3%	10,833
Diphtheria	1,280	8%	16,000
Whooping cough	691	5%	13,820

Measles	431	1.5%	28,733
Chicken pox	3		26,080
Smallpox	34		no estimate
Erysipelas	88	4%	2,200
Mumps	6		32,080
Total	20,921		1,032,846

Population—8,584,000

No estimate of the prevalence of smallpox has been made for lack of data. However, in Toronto alone there were 1,864 cases, with no deaths, during 1919.

The following table sets forth the number of deaths from the same diseases in the Registration Area of the United States, which area includes 77.8 per cent. of the continental population:

	Deaths	Prob- able case fatality	Estimated number of cases
Measles	8,806	1.5%	587,000
Erysipelas	2,579	4%	64,500
Scarlet fever	2,480	3%	82,600
Smallpox	339		70,000
Influenza	244,681		
Pneumonia	232,786	2%	23,873,350
Whooping cough	13,728	5%	274,560
Diphtheria	11,288	8%	141,000
Typhoid fever	10,210	7%	146,000
Rubella	191		50,000
Mumps	160		391,000
Chicken pox	113		326,000
Total	490,275		26,006,010

For both countries the number of deaths ascribed to each disease is fairly accurate, but the number of cases is estimated only. Statistics of a Health Department of reported cases are, of course, very inaccurate. The estimate of the number of persons ill with each disease is made from fatality percentages which are also presented. These percentages have been arrived at with some care, for the most part from intensive investigations at various places of each of the diseases mentioned. The estimate of the prevalence of mumps and chicken pox have been made from a careful study of

8,000 children, made by Hill in London, Ontario, which had for its object the determination of the number of diseases which children may be expected to have in a single year. It seems unbelievable that in the United States in the year 1918, 26,006,010 people were made ill by these diseases and that of this number over 490,000 died. The total number of deaths in the United States Registration Area for that year was 1,471,367, so that the number of deaths due to the diseases mentioned is about one-third of the total.

To be sure 1918 was an influenza year, but even when we subtract all deaths and cases due to influenza and pneumonia, all forms, there are about 50,000 deaths referable to the other diseases mentioned and much over two million cases. Normally there are about 15,000 deaths ascribed to influenza and about 150,000 to pneumonia. The number of deaths and estimated number of cases in Canada being for the year 1919 are not materially affected by influenza epidemic and probably are a fair average for each year. I am quite sure that the statistics presented are conservative and probably the number of cases are considerably underestimated.

Here is a problem for solution, and the only class of people capable of solving it rationally are physicians. In the past doctors have been too provincial and jealous to become vitally interested in public health, but if they do not rise to the occasion other persons interested in the saving of life and illness will take the leadership. Such leadership, while it may be honestly meant, necessarily will be misdirected, and, in reality, any poor results will reflect back upon the physicians. I doubt whether there has ever been such an opportune time to plan a campaign against infectious diseases or the launching of any other health project. The reading public have learned during the world war what physicians are capable of doing for humanity. This new knowledge should allay any fear which people may have had, that if doctors take the lead in the rational expenditure of money upon public health, they do it for mercenary motives. Anyone with a grain of common sense will realize that if measures of preventing death and illness from infectious diseases succeed, they are turning thousands of physicians out of the prospect of a livelihood. The Canadian people are to be congratulated that their legislators have established a Dominion Department of Health, a move which has for a long time been talked of in the United States. Having taken this responsibility, the Government should select for responsible heads men who have had training and experience. You will then be protected against inefficient

legislation and regulations. It will take time to obtain the full co-operation of the Provinces and so will the completion of the organization.

In planning health organization to combat infectious diseases it is necessary to have funds, and these should not be niggardly in amount. It is truly a government function and it should be financed by the government, local and national. Success will depend more upon the leaders and organizers than upon any other factor. They need to have a free hand and should be backed up so long as they are efficient. No politics should be allowed in the selection of personnel of the organization or in its administration. The officers should be selected on their merit because of training, experience and ability. Nothing is so fatal to a governmental organization as political dictation and interference, and surely in so important a department, which deals only with the prevention of illness and saving of lives, the public would wish it freedom of action.

In studying the organization there are a few essential features to be considered. One is the education and co-operation of all physicians. A Health Department may have ever so many inspectors, but it is the family physician who first sees the patient. The inspector responds to his call, and helps him in his diagnosis and sees to it that proper regulations are observed. He should, however, in a tactful way follow leads which may be discovered as to the source of any infection, and follow up susceptible contacts exposed to the discovered cases. Physicians conceal cases not infrequently for fear the patient may be sent to the hospital and thus suffer financial loss. Or more often the family begs the doctor not to report so that they will not be disturbed in their life routine and that they may avoid publicity. In other words, such persons do not care what happens to their neighbors and friends. Misery likes company. It is highly important that the public be educated out of this pernicious habit, and to the good habit of calling in a physician early in every acute illness. When a man has a large family of children and his income is small, to do so is impossible, or only done by a great sacrifice. The Health Department should have one or more physicians who are paid to respond to calls from families of this kind, who will either treat them or send them to the hospital. Success can only be attained by hearty co-operation of the Health Department, the government, practicing physicians and the public. We are handicapped very greatly by our lack of knowledge about infectious diseases. We do not know the cause of a great many of the most common ones. Because of this deficiency in our knowledge we

can only recognize the more or less typical cases of any disease, as, for instance, scarlet fever. The number of unrecognized cases of this disease is very large and may even equal those which are recognizable. Then, too, we cannot tell when a patient is free from infection. Again taking the example of scarlet fever, patients are isolated an arbitrary time, from 4 to 6 weeks, providing they have no nasal or aural discharges, and yet 3 to 5 per cent. of them are infectious. The carriers of this disease are just as numerous as are diphtheria carriers. In fact, these two diseases resemble each other very much in many epidemiological aspects.

For many diseases little is known of how they are transmitted under natural conditions and what measures are likely to be of avail. It would be a happy solution if satisfactory immunization methods against all diseases were known. And yet there would remain the great practical problem to get everyone to consent to it. Smallpox vaccination is a good example. This is a preventable disease and has been for 125 years, and yet it is a very common disease in Canada and United States, to our disgrace. But neither our lack of exact knowledge nor the opposition of the public, should deter from putting into practice all the knowledge which we have and the employment of all practicable methods of applying that knowledge. It is highly important that specific measures against all diseases be introduced. In the minds of the public infectious diseases are much alike and methods of prevention are much the same, to wit, the formaldehyde candle, etc. The rules and regulations applying to each disease should be based upon positive scientific knowledge as to its causative agent, the secretions and excretions which are infectious, how early and how late in the disease sick persons are infectious, what becomes of the virus after leaving the body and by what route or routes it enters the body under natural conditions.

There is only one phase of the infectious disease problem which I wish to discuss in any detail, namely, isolation. It cannot be denied that by keeping well persons from contact with persons sick with infectious diseases is logical, yet isolation is not always possible or practicable. Unfortunately we are able to discover and recognize only a certain percentage of cases. These diseases do not conform always to the text book picture. And just here I wish to state that text books on infectious diseases are very misleading, leaving the student under the impression that all cases can be diagnosed. More space should be given to a typical form of acute disease and they should clearly teach

that many cases go unrecognized. These missed cases then cannot be isolated. For such a disease as diphtheria it is not practicable to isolate all carriers. And for a disease like scarlet fever we have no means of recognizing them. It is obvious that isolation has its limitations. In several English cities for forty to fifty years scarlet fever and diphtheria patients have been hospitalized and for many years as much as 90 per cent. of patients have been treated in isolation hospitals, yet scarlet fever is as frequent as ever and diphtheria relatively more common. Yet isolation should not be condemned. Its greatest value is seen in the results of isolating the early cases in a threatened epidemic which may thus be cut short. Once an epidemic is under way isolation accomplishes very little. Its value is less evident in such endemic diseases as scarlet fever and diphtheria, although it surely does have a steady effect upon their prevalence. Certainly we do not see so frequently the periodic outbreaks of these diseases that were formerly experienced.

To accomplish the purpose intended, isolation should be as liberally applied as possible so that the public will co-operate and not attempt to conceal cases. The wage earners should not be disturbed unless necessary and the liberty of the other members of the family should be as unrestricted as can be safely allowed. Isolation should be rationally applied as indicated for each disease. Although it is not practicable to isolate all carriers certainly isolation should be applied to all persons who because of their occupation might be a menace to a large number of persons. Carriers and all suspicious cases among inmates of institutions, particularly where children are cared for, should be isolated.

Where shall the person be isolated? In England and in some American cities authorities have tried to send nearly all cases to the hospital. In London hospitals were opened for patients with scarlet fever in 1870. By the year 1890, 42.8 per cent. were treated in the Asylums Board Hospitals, and this percentage rose until in 1912, 90.6 per cent. were so treated. Yet, while the attack rate in 1891 was 270 per 100,000, in 1910 it was 230. During the interim it was variable, but higher than either of these rates, reaching 860 in 1893, and in 1897, 570. Diphtheria was first hospitalized in 1888. In 1890 the percentage of the hospital admissions was 17; in 1912 it was 86.4. Yet, though the attack rate in 1891 was 150, in 1910 it was 120, and during the intervening period considerably higher.

In Edinburgh 40 per cent. of the scarlet fever patients were admitted to hospitals in

1890, and this rose to 94 per cent. in 1910. In 1891 the attack rate was 604; in 1891, 380, and in 1910, 470. Thirty per cent. of the diphtheria patients in this city were hospitalized in 1890, and in 1910, 93 per cent. In 1881 the attack rate was 80; in 1891, 79, and in 1910, 159. In Huddersfield in 1881, 57 per cent. of the scarlet fever patients were admitted to hospitals; in 1910, 96 per cent. In 1881 the attack rate was 250, while in 1910 it was 870. The intervening years show considerable variations between these two rates. In Leicester in 1880, 28 per cent. of the scarlet fever patients were hospitalized; in 1910, 72 per cent. In 1880 the attack rate was 660, and in 1910, 450. Between these dates there were remarkable rises and falls. In 1885 the rate reached 1334; in 1893, 1254, and in 1906, 1050.

While the incidence of scarlet fever and diphtheria in England has not decreased very much during this period of intensive hospitalization the mortality has lessened very considerably. During the five years subsequent to 1875 the mortality of scarlet fever in the Metropolitan Asylums Board Hospitals was 13.5 per cent.; in 1913 it was 1.2 per cent. In 1888, when the first hospitals for diphtheria were opened the mortality was 59.3; in 1913 it was 6.2. It is fair to assume that extensive hospital treatment during this period in some way has been a factor. Granting that contagious diseases vary in severity at different periods, this consistent and gradual decrease in fatality cannot be wholly explained in this way. It has been suggested by Chapin that hospital isolation of the severe cases leaves the milder forms outside the hospital to propagate disease, thus leading to lessened severity as a whole. In the case of diphtheria the introduction of cultures and antitoxin has had a marked effect upon fatality, and it will be readily admitted that, treatment of this disease in a good hospital is more efficient than at home.

The infectious disease hospital should fulfil three important functions, namely, to save life by affording better treatment than the average home provides, to diminish or control infectious diseases, and for the convenience of the public. It should not be expected that any city build to accommodate all cases in an epidemic. In fact, epidemics of more than one disease may be simultaneous. The hospitals should be large enough, with some margin, to take all cases necessary that occur during an average year. When epidemics occur admissions should be confined to those patients who are sickest or most need hospital care. It is safer for the family in which there is infectious disease to have the primary case removed to the hospital.

Few statistics have been published to support this well recognized fact. Chapin, in his 1913 report, shows that among 13,082 persons exposed to 3,078 primary cases of diphtheria which were treated at home, 798 secondary cases of diphtheria developed at home, a rate of 6.10. In his 1911 report a table shows that among 6,176 persons left at home after the removal to the hospital of the primary cases, 150 secondary cases developed an attack rate of 2.4, or almost one-third the rate among those exposed when the primary cases were treated at home. In his 1919 report he shows that among 10,387 persons exposed to 2,063 primary cases of scarlet fever who were treated at home, 827 secondary cases developed an attack rate of 9.9. In his 1911 report he shows that among 3,410 persons left at home after removal to the hospital of the primary cases of scarlet fever developed an attack rate of 2.4, or about one-fifth the rate when the primary cases were treated at home. Each case must be decided on its merits. Cases found in large families, in boarding houses, rooming houses, hotels, institutions, etc., certainly should go to the hospital. Many persons will prefer to send their children to the hospital because it is cheaper or because home isolation is burdensome. Persons will also go many times because they believe they will get better treatment. Where, however, the number in the family is limited, the people are able to furnish proper treatment and can be expected to carry out home isolation, there is no good reason for sending them to the hospital. Hospitals in the large cities of the United States isolate anywhere from 25 to 50 per cent. of the cases of scarlet fever and diphtheria. The isolation hospital is a very important institution, and no city should be without one. It should be a good hospital, and not a pest house. It should be well built and equipped and staffed by persons who know how to treat infectious diseases and how to prevent cross infections.

We have arrived at a stage where the belief in air borne infection is given little weight. It was a few pediatricians in France who between 1885-1890 first pointed out the frequency of pneumonia transfer among measles patients treated in hospitals, and first tried out isolating them in small groups, the pneumonias by themselves, and observing strict cleanliness, doctors and nurses scrubbing their hands and by sterilization of utensils. Between 1890-1900 Grancher, of the Hospital for Sick Children in Paris, isolated scarlet fever, diphtheria and measles in the open ward with patients sick with general diseases. He put a wire screen about the bed, inside of which enclosure were put the patients' utensils. Everything was sterilized

which came out of this enclosure and doctors and nurses washed their hands. There were a few cross infections, but so few that it was evident that air-borne infection could play no important role or there would have been hundreds. The Pasteur Hospital built in 1900 was constructed so as to be able to put patients in one bedroom, or in rooms for no more than three patients. Lavatories were supplied to each room, and sterilizers for utensils on each ward. It was the first hospital to be built in which isolation was carried out strictly on the contact theory. Strict surgical cleanliness was practiced so that nothing coming in contact with a patient suffering from one disease would come in contact with patients suffering from other diseases without sterilization. This hospital has accepted for treatment all kinds of infectious diseases, including smallpox. The cross infection rate has been a fraction of one per cent.

Medical asepsis has also been tried in England and is being used in many hospitals. They find it safe for all diseases, except measles and chicken pox. Rundle of Liverpool and others feel that these diseases should not be excepted.

In 1910 the Providence City Hospital was completed for the treatment of contagious diseases. It was constructed and equipped to carry out medical asepsis or aseptic nursing. During the last eleven years all kinds of infectious diseases have been admitted and a very great many patients have been sent in for observation or diagnosis. I present here a table showing the number of cases of each disease admitted. These statistics do not include cases of pulmonary tuberculosis, which since 1912 have been treated in a separate building. For two years previously these patients were treated in the second storey of the diphtheria building. There has never been a cross infection among these tuberculosis patients.

Patients suffering from all other disease to the number of 13,176 are as follows:

Chicken pox	140
Diphtheria	3,481
Erysipelas	100
Gonorrhoea	210
Influenza	557
Measles	1,132
Meningitis	68
Mumps	66
No disease	185
Other diseases	3,270
Pneumonia	44
Poliomyelitis	87
Rubella	151
Scarlet fever	2,744
Tonsillitis	482

Tuberculosis (children)	31
Typhoid fever	9
Typhus fever	4
Variola	32
Whooping cough	383
Total	13,176

Actually there have been more diseases than are represented in this table, since some patients had more than one disease.

A very careful record of the cross infection rate has been kept and each case has been discussed in the several annual reports of the hospital. Below is the cross infection rates indicated by years as follows:

1910	2%
1911	2%
1912	6.3%
1913	1.7%
1914	1%
1915	4.6%
1916	1.8%
19178%
1918	1.9%
19195%
1920	1.4%

Actually measles and chicken pox have accounted for about two-thirds of these diseases contracted. It will be noted that the rates in 1912 and 1915 were high. These were years when the hospital was crowded and conditions obtained which should never be allowed beyond a certain point. It is then that trouble arises. It is far better to leave some patients at home, selecting those who most need hospital treatment. Overcrowding should never be allowed. And yet, in certain English hospitals which have kept reliable data in the past the rate has been about 7 per cent. in wards or buildings where only one kind of disease has been admitted. I venture to say that the cross infection rates represented compare favorably with those of general hospitals for children.

The Providence City Hospital has six wards for patients. One is devoted to scarlet fever and one to diphtheria. Into the other wards are admitted all kinds of diseases, cases for observation and overflow scarlet fever and diphtheria patients. In fact, we treat in the scarlet fever and diphtheria wards other diseases at times, but for obvious reasons it is best to segregate diseases in separate wards, providing there are enough to keep a ward busy for each. If these results are accepted as practical it opens a wider field of usefulness for the contagious hospital. Instead of treating scarlet fever and diphtheria only, all kinds of acute infectious diseases can be treated in the same

hospital, consisting of even a single ward. It renders it possible financially for small cities and towns to build hospitals and be reasonably assured that there will be patients enough to keep a ward open all the time. I venture to suggest that into contagious hospitals will be sent even pneumonia and other acute diseases now treated in wards of general hospitals. It is logical for the nursing of acute infectious diseases in the same ward where heart and kidney and other such diseases are treated does not lead to the best results. The wards are usually not properly equipped and not properly conducted. If all acute diseases are not to be treated in such a hospital, general hospitals should set aside wards for their treatment. In fact, there is no reason why on the grounds and under the same management of a general hospital, an infectious disease hospital should not be located. It is absolutely essential, however, that such a contagious hospital should be presided over by one man who has had experience in the diagnosis of infectious diseases and know, both how they are transmitted and how to prevent it under hospital conditions. The hospital should be divided into small units so that no room should contain more than four to six beds, and 50 per cent. of its patients should be accommodated in rooms for one or two. The equipment is highly important. Aseptic nursing should only be attempted when there is a special lavatory in each room so that hands can be washed in running warm water. There must also be a sterilizer for disinfecting all utensils. The nursing staff, on which the success of the

technique will most depend, must be trained in the details of medical asepsis and the superintendent should have had some previous experience. It is teamwork which makes success possible, just as it does in the operating.

In closing I want to point out what such a versatile infectious disease hospital, apart from saving life and infection, would mean to any country. In United States during the war the army authorities were unable to discover many physicians and nurses who were qualified to care for infectious diseases. Few contagious disease hospitals have trained internes and very few have given courses of training to nurses. Hospital and medical school boards have not encouraged it for fear students might become infected and die. The time has come when doctors and nurses should be trained in contagious hospitals and these hospitals will multiply in time to a point where this training will be available to nearly all.

Such a hospital would furnish constant and varied material for research. Research laboratories should be right on the grounds, for too many are located at a distance from the material needed for investigation. There is so much yet to be learned.

I believe we may look forward to the development of this type of hospital, as a place where the acute ill can be adequately cared for, where they can be isolated from others, where doctors and nurses can be trained and where research workers will have abundant material for furthering our scientific knowledge.

Cost of Medical Education and Tuition Fees

The statement is being made that the cost of obtaining a medical education has so increased in recent years as to make it prohibitive except for the well-to-do. The facts do not warrant this statement. It is true that the cost of furnishing a medical education has greatly increased, but this has affected tuition fees to only a moderate extent. Fifteen or twenty years ago the majority of medical schools were meeting their expenses from students' fees; now it is considered quite impossible for a medical school to teach modern medicine unless, in addition to students' fees, it has a generous income either from state appropriations or from private endowment. The actual expenditures for the teaching of medical students by eighty-two medical colleges during 1913-1914 gave an average of \$419 a year for each

student, as compared with an average of \$150 a year for each student paid in tuition fees. On the average, therefore, the expenditure was nearly three times what the student paid in fees. The tuition fee which each student paid in some medical schools was only one-tenth or even less of the money expended for his instruction. The highest fee now is \$350 a year; in 1914 it was \$250. At the same time, greater provision has been made for deserving but needy students than previously in that more than 300 free scholarships and generous loan funds have been established in about forty of our better medical schools. Aside from the higher living expenses, the cost to the student for obtaining a medical education is only slightly higher than it was fifteen years ago.—*Jour. A. M. A.*, July 23, 1921.

THE DETECTION OF LAMBLIA (GIARDIA) INTESTINALIS BY [MEANS OF THE DUODENAL TUBE*]

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THE bacterial flora of the intestine, its numbers and composition, are known to everyone. Most of these bacteria are harmless, a number are potentially dangerous, a few must, when present, always be regarded as pathogenic. The allied fact that there is a corresponding animal fauna of the intestine, some of the members of which are harmless, some pathogenic, and yet others of doubtful character is not yet sufficiently recognized. As there is a normal bacterial flora of the human intestine, so there is a normal protozoal fauna, and the majority of both may be regarded as harmless.

The examination of the intestinal contents of the troops quartered in tropical countries during the war, an examination primarily intended to determine the presence of pathogenic intestinal protozoa such as the Entamoeba histolytica, revealed the interesting fact that in a startlingly large proportion of cases the faeces contained various kinds of protozoa, often in great numbers. This led to an investigation of the civilian population in the home lands, and it is now well established that protozoal infections are of much greater frequency than has hitherto been suspected. In using the word "infections," however, I wish rather to signify the presence of animal parasites than to pronounce judgment on their pathogenic properties. Whether some of these animal parasites are or are not pathogenic is a vexed question at the present moment. Indeed the very use of the term parasite may be misleading, for it is by no means certain that some of the denizens of the bowel are anything more than mere harmless commensals.

There are three common protozoal parasites found in man. These are the Entamoeba coli, the Entamoeba histolytica, and the Lamblia (Giardia) intestinalis. The frequency with which these occur in the faeces varies in the reports of different workers in different parts

of the world. Wenyon and O'Connor, whose investigations are amongst the most valuable on the subject, found that amongst the healthy British troops in Egypt the Entamoeba coli was present in 20 per cent., the Entamoeba histolytica in 5.3 per cent., and the Lamblia intestinalis in 6.8 per cent.

It may be objected that the subjects of these investigations were living in a tropical country where there was every facility for becoming infected with animal parasites. Surveying, however, all the recent work done in the United States, England, and France, Hegner and Payne obtained even higher figures, as follows: E. coli, 20 per cent., E. histolytica, 9 per cent., and Lamblia intestinalis, 9 per cent. In this communication we are especially concerned with Lamblia infections, and it may be noted that Sanford in a series of 6,000 cases examined routinely at the Mayo Clinic, Rochester, Minn., found Lamblia in the stools in 1 per cent.

A recent paper by Maxcy emphasizes the important fact that Lamblia infections are very much more common in children than in adults. In a series of 89 cases he found that one of every five children over one year of age harboured Lamblia. It is more than probable that the infection is spread from child to child in much the same manner as in the case of *Oxyuris vermicularis*.

Of the three common protozoal parasites E. coli and E. histolytica inhabit the large intestine, while Lamblia intestinalis is found in the duodenum. The means of detection of these parasites is by examination of the faeces. The object of this paper is to suggest a simpler and probably more certain method of finding the Lamblia, by the use, namely, of the duodenal tube. For this purpose the notes of a case recently under observation in the Winnipeg General Hospital are here given. For the use of these notes I am indebted to Dr. Fred Young.

Case.—A man, 28 years of age, born in South Russia, but resident for eight years in Canada, was admitted to the General Hospital suffering from a febrile condition which proved to be

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typhoid fever. Rose spots were well marked, but there was no enlargement of the spleen nor any diarrhoea. The Widal test was positive, and typhoid bacilli were recovered from the stools. The disease ran a usual course, and the patient was ready to be discharged from the hospital. In order to determine whether or not he was a carrier Dr. Young passed the duodenal tube, and by means of Lyon's magnesium sulphate method obtained the contents of the gall bladder and duodenum.

The bile was clear and appeared perfectly normal. A culture was made, and the centrifuged deposit was examined under the low power. The picture which met one's eye was remarkable in the extreme. The microscopic field was swarming with animalecules in the highest state of animation, some dodging this way and that, others spinning round in mad gyrations, now and then pausing to rest. Stained slides showed the presence of a typical flagellate protozoon, *Lamblia intestinalis*. No fragments of any kind were observed. A pure culture of typhoid bacillus was obtained from the bile.

On the following day the duodenal tube was again passed, but the microscopic picture was a very different one. In place of the swarms of motile lamblia there were numerous fragments of varying size and shape, with here and there a motionless lamblia. Not a single living one could be discovered. What is the explanation of this dramatic change, and what do the fragments represent? It appeared to us that the magnesium sulphate solution, through virtue of its osmotic power, had blown the lamblia to pieces, and that the fragments represented all that remained. On some of the fragments an indication of the saucer-like sucker of the lamblia could be made out.

The patient left the hospital on the following day for a remote part of the province, so that no further investigations could be made. A month later, during my absence from the city, he returned for one day. On examination of the bile no lamblia were found, but typhoid bacilli were still present.

It is not suggested that the lamblia were present in the gall bladder. They were merely recovered from the duodenum together with the bile from the gall bladder.

The usual method of diagnosing lamblia infection is by examination of the stools. The parasites may be found in two forms; the encysted, which is the common variety, and much more rarely the motile. Unless the stools be examined within a few hours of being passed the motile forms die and disintegrate. The cysts, being so very much smaller than those of the metazoa, are apt to be missed under the

usual low power examination. By means of the duodenal tube, however, an abundant supply of actively motile parasites can be obtained, which can be recognized at a glance even by those not familiar with such examinations.

In this case the question naturally arose as to the relation of the lamblia infection to the disease from which the patient was suffering, and this opens the wider question of the pathogenic possibilities of lamblia infection, of whether, that is, it is justifiable to speak of such a condition as lambliasis. The views expressed in the literature regarding this matter are remarkable for their wide divergence. Park and Williams, Allbutt and Rolleston, Besson, and others stoutly maintain that lamblia is non-pathogenic. Still, on the other hand, considers that it is responsible for a chronic and intractable diarrhoea, a condition minor only in importance to amoebic dysentery.

The problems cannot yet be said to be solved. Sanford, in his study of 41 cases, came to the conclusion that lamblia should be considered as pathogenic, but that it produced no distinctive syndrome. In many of the cases there were diarrhoea without blood or mucus, rumbling in the bowels, lassitude, and nervous indigestion. Of the 41 cases 19 gave a history of over five years.

Wenyon and O'Connor consider that of all the flagellates in the human intestine the lamblia is that which is most probably pathogenic, but that it by no means always produces symptoms. They describe cases suffering from attacks of diarrhoea in which a large amount of yellow mucus was passed containing myriads of the active unencysted form of lamblia. Such attacks recur at intervals, always accompanied by the same discharge of infected mucus. In such cases it would appear that the mucus must be produced at the site of the infection, in which case the pathogenic action of the lamblia would be proved.

The experimental work of Fantham and Porter is of considerable importance. Kittens and mice were used. Marked diarrhoea was produced, and autopsy showed great congestion of the stomach and upper part of the intestine, together with, and this is particularly interesting, erosion of the cells of the mucosa, due apparently to the action of the suckers by means of which the lamblia attach themselves to the epithelial cells. They conclude that lamblia may be distinctly pathogenic in man, and they suggest that rodents such as rats and mice, in which the infection is particularly common, may very well act as a reservoir.

In our own case it is improbable that the Lamblia infection had anything to do with the symptoms from which the patient suffered.

The disappearance of the parasites after the use of magnesium sulphate was probably due to the disruptive effect which such a strong solution would, by virtue of osmotic action, produce on the delicate bodies of the lamblia. Only the shattered fragments remained to tell the tale on the following day. Methylene blue, arsenobenzol, and many other substances have been used in the effort to expel the invaders, but with little success. It is suggested that for this purpose strong solutions of magnesium sulphate are worthy of a trial.

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THE NATURE OF X-RAYS AND SOME OF THEIR APPLICATIONS

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THE discovery of x-rays and some of the developments of science which arose therefrom are illustrative of the uncertainties which hover on the horizon of the prospector in the investigations of the phenomena of Nature, uncertainties which are much like those that beset the prospector for precious minerals in regions of which even he has limited knowledge, and in which he has few fellow-explorers. He alone may have a well-organized and fairly extensive knowledge of the field in which he explores and he may, as he usually does, labor long and assiduously. He will, indeed, stake claims and gather nuggets which will add to the wealth of the world and stimulate further exploration. He must, however, always have in mind the possibility that some worker in a neighboring field may dig a cross trench, or that a chance visitor may make a lucky stumble and uncover the hidden wealth of his field of activity. This very uncertainty is the lure of the wilderness. It fascinates the explorer, and, once a pros-

pector, it is impossible to turn him aside, even though the handicap of uninterested capital, the insufficiency of equipment in his pack train, or the active obstruction of trail followers threatens to overwhelm him. He presses on buoyed always by the hope that the result of his efforts, however long withheld, will be at last a philosopher's stone or an elixir of life.

X-rays was a "find" in the domain of the discharge of electricity through gases. Röentgen at Wurzburg was a prospector in the field of light, and even there he was hardly a well-seasoned prospector, and in the former field he was only a casual visitor. A great deal of exploration in the realm of the discharge of electricity through gases, in which the findings were largely of a qualitative character, had been carried out by such men as Sir William Crookes, Sir J. J. Thomson, J. Plücker, W. Hittorf and others, and it was known, among other things, that the discharge depended in

character, on the size and shape of the electrodes, on the potential set up at the electrodes, on the nature and pressure of the gas and on the size and shape of the containing vessel. It was also known that the discharge was of a twofold character, that negative charges were shot out from the cathode and positive charges from the anode, and particularly was it noted that when the pressure of the gas in the tube was low enough, there was a fluorescence of the tube near the cathode.

This fluorescent light interested Röentgen. He knew that ordinary light was complex and that if it were analyzed it presented a spectrum of various wave lengths, a portion of which was visible and other portions of which were infra red or ultra violet, and he knew that the ultra violet portion would excite fluorescence in certain substances, e.g., barium platino cyanide. He wished to know if this fluorescent light in the discharge tube had an ultra violet portion. He covered his tube with black paper to shut out the visible light, started the discharge, and, turning, found his barium platino cyanide screen on the table glowing beautifully. He next got photographic plates and found he was able to obtain shadowgraphs of dense substances enclosed in lighter material and in particular of the bones of the body through the encasing substance. Of course, others were interested immediately and the third outstanding property of the new radiation was quickly found, viz., that it would render a gas a good conductor, a property that became of considerable assistance in subsequent investigations. Röentgen thought the new radiation was a part of the fluorescent light from the bulb. It occurred to Henri Bequerel at Paris that if this were true one should find it as a part of the light from materials which were well known to have the power of fluorescing or phosphorescing after exposure to a bright light, such materials, for example, as calcium sulphide, zinc sulphide. His efforts were fruitless until he tried uranium salts, and here he found that a radiation was emitted even though the salts were not fluorescing. This new trail led to the discovery of radium, polonium, radio-thorium, actinium, etc., and to an extensive investigation of the properties of their radiations.

These discoveries almost immediately stimulated intense interest and activity in a wide sphere, not only in physics, but also in chemistry, geology and biology, and more particularly in the medical world. Here the significance of the discoveries was quickly appreciated and there was almost a stampede of prospectors. But, unfortunately, these prospectors, who might have co-operated advantageously, parted company. The medical man attached to

himself or became attached to the instrument manufacturer and the physicist was left to blaze out further trails alone, logically perhaps, for he had not hitherto been associated very closely with either the medical investigator or the manufacturer. The results were disastrous. The trail is dotted with the remains of men who had been enthusiastic, but unguided and poorly equipped medical prospectors, with here and there the remains of an unfortunate patient, the sacrifice of those who gave their bodies or their lives to save their fellow-men. This was a tragedy which subsequent developments have shown conclusively might easily have been averted if there had been sufficient communion and co-operation between the pioneer explorers, the physicists, and the ill-prepared prospectors, the medical men, who followed.

But let us return to the trails which the physicists explored. The stream of negative charges from the cathode, and of positive charges from the anode were examined carefully and minutely, and their properties, including their velocity, their mass and the quantity of charge that is associated with them, were determined accurately. They were called cathode rays and anode rays, but these names gave place later to electrons and positive nuclei or ions. It was readily shown that the x-rays were not a part of the fluorescing light from the side of the glass tube, but that they were produced by the impact of the electrons on any material substance, such as the glass or the anode. A metal target was put in their path and the supply of x-rays was made more abundant. They were found to be complex, varying greatly in penetrating power and in photographic and fluorescing activity, and this was attributed correctly to the different speeds with which the electrons hit the target. Wehnelt discovered that electrons could be obtained more easily from a hot cathode than from a cold one. Extensive investigation of this source of supply and of the character of the emission of the electrons therefrom by Sir J. J. Thomson, O. W. Richardson, I. Langmuir and others led, on the one hand, through the production of the amplifier by H. J. Van der Bijl and W. Wilson, to the development of long-distance telephony and wireless telegraphy, and more recently to the development of wireless telephony and multiplex telegraphy and telephony, and on the other hand, through the skill of W. D. Coolidge and J. E. Lilienfeld, to the production of an x-ray tube in which a hot cathode is the source of supply of electrons.

Two types of generator for producing the high potential, which is necessary to give a high velocity to the electrons, were developed.

In Europe the induction coil, with various forms of interrupter in the primary, were in use, and in America the ordinary transformer or interrupterless coil was in general use. The stream of electrons which is obtained in the x-ray tube by the use of these generators differs considerably. The former generator gives a large proportion of electrons of high speed, but not, however, of continuously steady speed which by their impact on the target produce a beam of x-rays that has a correspondingly large proportion of penetrating rays, but which at the same time does not remain uniform, while the latter generator gives a steady stream of electrons whose velocities are more uniformly graded, and there is produced a beam of x-rays in which the varying penetrability is fairly evenly proportioned. Of recent years the coil with the interrupter has come into use in conditions where thick, dense materials have to be penetrated, e.g., in the investigation of metals, woods, etc. For less dense materials the interrupterless coil may be more advantageously used to show small gradations of density.

Meanwhile the actual character of the x-rays was in doubt. Many of the investigators, including Röentgen, considered that they were simply the electrons which bounded from the target, but which had lost their negative charges. If this was their character they should, when absorbed, give rise to considerable heat. But the quantity of heat developed when x-rays are absorbed in so small as to be difficult of detection. Others believed that they were waves produced by the impact of the electrons on the target, in a manner somewhat analogous to the production of light waves when two bodies moving with great speed collide. If they were like light waves they should, of course, have the properties of light waves, e.g., the properties of reflection, refraction, polarisation, diffraction and interference. But experiments to show these gave negative results. The instruments ordinarily used for the analysis of light are the triangular prism, a ruled grating or a plate of transparent substance whose faces are parallel and almost ideally plane or smooth. These instruments will decompose the light into a continuous spectrum of colors, red, orange, yellow, green, blue and violet, or into a line spectrum in which only small portions of the whole spectrum exist. Further, it is known that this does not comprise the whole spectrum, but that there are invisible portions, the infra red and ultra violet portions, and further it is known that this extensive spectrum means that the source sends out a complex beam of waves of various wave lengths. Attempts to analyze

x-rays with these instruments failed. It was suspected that the failure was due to the shortness of the waves of x-rays and that the inequality or other conditions on the surface or in the interior of the prism, or grating, or plate were such that the waves were scattered, for in all these experiments a considerable scattering of the x-rays was apparent.

In 1912 it occurred to Laue of Munich to make use of the cleavage planes of a crystal which in a well formed crystal should be parallel and ideally plane. The experiment was carried out with the assistance of his colleagues, Frederick and Knipping, and was a great success. A spectrum of the x-rays was obtained. Professor W. H. Bragg and his son, W. L. Bragg, then of Leeds University, modified the experiment, making it exactly like the ordinary method of using a plane parallel plate with which to get the spectrum of light, and significant and far-reaching results were the reward of their efforts. They showed that both kinds of spectra existed. There was a continuous spectrum extending from wave lengths $1/1000$ to wave lengths $1/10000$ that of ordinary light. There was also a line spectrum comprising three series of lines, the K, L, and M series, whose wave lengths were characteristic of the metal of which the target was made. Almost immediately it was shown by Moseley at Manchester that the wave lengths of these characteristic lines bore a simple relationship to the atomic number of the element in the target, viz.: $V = A(N-B)^2$, where V = the frequency, i.e., the number of waves emitted per second. N = the atomic number. A and B are constants for each series.

All of this development is of paramount importance to the medical radiologist, though much work still remains in the elaboration of the results for progressive development in medical applications. This time, however, there are evidences of closer collaboration with the physicists. Several hospitals have one or more physicists on the staff. The manufacturer himself, in an effort to keep pace with the requirements, has established a research staff of physicists, and in some cases these are associated with biologists and pathologists. The horizon is rapidly widening and the results of combined efforts are growing apace. Consider an example of this. Much experimenting has been done by empirical methods on the application of x-rays to organisms and cells for therapeutic purposes, but the results, though extensive, have been irritatingly contradictory. There were several methods of measuring dosage in use, notably the aluminum penetrometer and the Saboraud pastilles, and where penetrating

x-rays were required, aluminum filters were used to absorb the softer radiation.

The discovery of the complexity of the spectrum of x-rays shows this to be unsatisfactory. Professor S. Russ, physicist of the Middlesex Hospital, London, had shown, by the application of the spectrum of ordinary light to bacteria embedded in a medium followed by culturing, that there was a selective bactericidal effect. It seemed almost imperative that the x-ray spectrum should be investigated similarly. First, however, the absorbing effects of different filters were carefully investigated with the following significant results. If a filter of any metal were used, say, aluminum, it absorbed strongly the wave lengths longer than that of its own characteristic emission spectral lines, but transmitted an intense beam of waves of this length, while it cut off practically all the general radiation of wave length shorter than this and much of the characteristic radiation emitted from the target. This result itself is illuminating to those who have had discordant results with targets of different alloys and aluminum filters, complicated by the fact that the organisms were different and the strong probability that the x-ray spectrum, like the ordinary light spectrum, is selective in its ac-

tion. During the past year or two investigations have been in progress with a fairly precise knowledge of the targets and filters in use, and methods of measuring dosage are being developed in which the complications detailed above may be avoided. The method which seems to give the most hope of success is based on the property which x-rays have of ionizing a gas, which is shown by the fact that the gas under the action of x-rays becomes a better conductor of electricity, while there is evidence from other directions that the changes which accompany the application of x-rays to organisms and cells are at least associated with an ionization process in these organisms and cells themselves, and the use of this property appears, therefore, to be the most direct way of measuring the quantity of radiation which is applied. This ionizing property of x-rays has recently been made use of by Major C. E. S. Phillips, physicist of the Royal Army Medical Corps, in a new method of measuring x-ray dosage during the actual process of application of the rays for treatment purposes, and the method gives promise of eliminating much of the uncertainty that has existed hitherto in the measuring of dosage.

A Layman's Defense of Animal Experimentation

The July issue of the Woman's Home Companion contains an important article, entitled "The Truth About Vivisection," by Mr. Ernest Harold Baynes, well known throughout the United States as an animal lover. Horrified by the statements of wanton, even demoniac, cruelty in laboratories, which he had read in anti-vivisection literature, Mr. Baynes determined to learn whether these statements were true, and, if true, to work vigorously for immediate abolition of the evil. He soon discovered that the literature was characterized by misstatements of fact, by perversions of truth, and by suppressions which were equivalent to falsehoods. His inquiry quickly led him to perceive that the two central propositions on which the anti-vivisectionists base their propaganda are that animals are ruthlessly tortured to gratify the curiosity of the heartless experimenters, and that the results are of no benefit whatever. The first of these claims he investigated by visiting, unheralded, a number of active laboratories and watching the experimental procedures. He found, not "brutality and heartlessness," but kindness and consideration. He was interested to observe posted in the laboratories certain rules regarding the care of animals. These were formulated more

than a decade ago by the Bureau for the Protection of Medical Research of the American Medical Assn., and have been formally adopted and are being enforced in every medical school and medical research institute in the country. The claim that the experimental method in medicine has been useless Mr. Baynes learned was overwhelmingly disproved by unimpeachable evidence. In presenting the case to his readers he cites the results of diphtheria antitoxin, of asepsis in relation to surgery and puerperal fever, of anti-typhoid vaccination, and of the human experiments which disclosed the mode of transmission of yellow fever. No more effective attack on the methods and assertions of the anti-vivisectionists has ever appeared in a popular journal. It has stirred the anti-vivisection societies to frantic retaliation. For spreading broadcast this instructive examination of the misleading statements and claims of the anti-vivisectionists and of the procedures and achievements of experimental research in medicine, the gratitude of the entire medical profession and of well-informed citizens everywhere is due to Mr. Baynes and to the editor of the Woman's Home Companion.

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UNSUSPECTED SYPHILIS OF THE NERVOUS SYSTEM: ITS LABORATORY DIAGNOSIS*

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IN THREE PARTS

PART ONE

THE intention of this paper is to present the subject of syphilitic involvement of the central nervous system as it exists when clinical signs and symptoms of disturbed nervous function are absent.

For many years it has been believed that even the late syphilis of the brain and spinal cord developed as a result of invasion of these tissues by spirochaetes during an early stage of the disease. Lang, in 1881, stated that "an organ which is the seat of a gummatous lesion must have been affected in the early period of syphilis."

The researchers of Neisser demonstrated that the organisms become generalized very soon after inoculation, and that the brain and other organs may be invaded long before the inoculation sore appears. By infecting monkeys experimentally and excising the site of inoculation at different intervals of time, he found that, if syphilis was to be prevented, it was necessary to excise this area within the first twelve hours; he also demonstrated spirochaetes in the blood five days after inoculation.

Eberson (1) infected rabbits by intratesticular injection and showed that as early as seven days after injections spirochaetes were present in the regional lymphatic glands and in the blood.

Brown and Pearce (2) performed similar experiments and found that the regional lymph nodes contained spirochaetes forty-eight hours after inoculation of the testicle. This was a constant finding. They also demonstrated that spirochaetes were in the blood at the end of a week. This early invasion was the commencement of a true generalized infection, for excision of the scrotum and testis at the end of four-

ty-eight hours did not prevent the onset of generalized syphilis. They further pointed out that the nervous system of the rabbit may be affected very early in the disease. In one rabbit the spinal fluid was shown to contain *spirocheta pallidum* eight days after the inoculation lesion had appeared in the testis.

The fact that the spirochaetes become generalized very soon after infection is of practical importance. They are lodged in various organs long before any inoculation sore appears, and, therefore, in man, one may expect to find changes in the nervous system at the earliest time at which it is possible to make a diagnosis of syphilis.

The investigation of patients for evidence of early involvement of the nervous system has only been carefully studied within recent years. In 1903 Ravaut (3) examined the cerebro-spinal fluid of secondary syphilitics, most of whom were showing no evidence of nervous disease, and in a large proportion found increased cells and other abnormalities. Of 100 cases only 28 could be said to have had normal spinal fluids. When lumbar puncture came to be used more frequently the cases in the later stages of syphilis were found in turn to have similar alterations of their spinal fluids. From 1911 onwards there are occasional papers on this subject.

Zaloziecki and Frühwald (4) examined thirty cases of early syphilis without evidence of nervous disease. Eleven had cerebro-spinal fluids with increased cells—from 11 to 212 per c.m.m., and two of these showed increased globulin and positive Wassermann reactions.

Altmann and Dreyfus (5) detailed the findings in 170 cases of syphilis in all stages. They found amongst the secondary and latent cases, twenty-seven with abnormal cerebro-spinal fluids and showed that the abnormality may be reduced by salvarsan treatment. Wile and

*Read before the Laboratory Section of the Canadian Public Health Association, at Toronto, 16th May, 1921.

Stokes (6) laid special emphasis on the occurrence in early syphilites of "neuroretinitis," and of involvement of the auditory apparatus, as shown by diminished bone conduction.

In 1908 With (7) published a report of 316 cases whose cerebro-spinal fluid had been investigated. In all stages of the disease, including the primary, he found some cases with over ten cells per c.mm. in the cerebro-spinal fluid.

These and other papers giving sparse information, not here quoted, make it evident that abnormality of the cerebro-spinal fluid may be present in all stages of syphilis and may exist without clinical signs of nervous disease.

The basis of the present paper is a series of 1,314 unselected cases of syphilis, examined in a routine manner, as they appeared for diagnosis or treatment in a syphilis clinic. They were studied (8,9) in a Naval Hospital in England in association with Hon. Surg. Lieut.-Com. Paul Fildes, R.N.V.R., in charge of the laboratory, and Surg. Lieut.-Com. R. J. G. Parnell, R.N., in charge of the Venereal Department. The series includes every case of syphilis admitted to the department during the period of study. The obvious nervous disorders such as tabes dorsalis and dementia paralytica were admitted to the neurological section so that the results from the series are based on unselected cases and indicate what may be expected from a similar selection made at random elsewhere on similar material.

The routine examination consisted in fixing the date of infection as accurately as possible, although considerable effort was sometimes required to do this. Patients were stripped for clinical examination and lumbar puncture was performed. In a certain number the central nervous system was thoroughly investigated and the eyes and hearing were examined with the collaboration of specialists when this was indicated.

The cerebro-spinal fluid was examined with in two hours after removal. This is important, as cells disappear if the fluid is kept (10). The cells in one-half a cubic millimetre were counted to ensure accurate results (11). Normal fluid usually contains no cells or at most one or two per c.mm., but to limit precisely the number that may occur within physiological conditions is a difficult matter. It was, how-

ever, the general opinion that a count of ten cells was distinctly high, and this number, therefore, was taken as an index of an abnormal condition. The cases that had between 5 and 9 cells per c.mm. (both inclusive) in their spinal fluid were classified as doubtful as to involvement of the nervous system, but results have shown that in all probability these cases were really cases of cerebro-spinal syphilis. Cells up to four in number were taken to be within normal limits.

In performing the Wassermann reaction the cerebro-spinal fluid was inactivated. The reason for this technique is an earlier observation by Fildes and McIntosh (12) that when the meninges are acutely involved, as in meningo-vascular syphilis, the reacting substance in the cerebro-spinal fluid may be demonstrably different from that found when the lesion is parenchymatous as in general paresis. In the meningo-vascular lesion the reacting substance is more thermolabile and they suggested that this is due to the presence of a transudate from the blood. That is to say, in this type of lesion the reacting substances in the spinal fluid are derived from two sources—the diseased tissues and the blood. In general paresis the blood transudate is not a factor; all the reacting substance comes from the diseased tissues. The difference consists in the presence of blood transudate in one case and not in the other. Normal serum, if unheated, is capable of giving a positive Wasserman reaction in low dilution and, therefore, when an acute meningeal lesion is present the unheated spinal fluid may contain a non-specific Wassermann producing substance. For this reason and in view of the large amount of cerebro-spinal fluid used in this series, a routine inactivation was adopted. Each fluid was tested in four tubes containing 0.8 cc., 0.2 cc., 0.05 cc., and 0.012 cc., using 0.5 cc. of a five per cent. suspension of sedimented sheep's cells.

No globulin or albumin tests were made in the cerebro-spinal fluids, partly owing to the pressure of work and partly for the reason that when the results of a cell count and a Wassermann reaction were at hand we could not see that globulin or albumin tests were of any assistance.

(To be continued in next issue.)

THE CLINICAL ASPECT OF SUB-ACUTE BACTERIAL ENDOCARDITIS

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THIS description of the Clinical Aspect of Sub-acute Bacterial Endocarditis was given before the Academy of Medicine, Toronto, November 7th, 1920, with an exhibition of the post-mortem specimens, and with the clinical history and post-mortem findings of the cases.

The entire bacteriological and pathological work in connection with the cases was done by Dr. G. W. Lougheed, who has included a summary of his findings.

The patients were all ex-soldiers under treatment by the Department of Soldiers Civil Re-establishment; they represent only a small proportion of the cases we have seen suffering with this condition and under treatment by the medical staff of the D. S. C. R.

Of the 25 cases which form the basis of this clinical analysis 23 have died, a post-mortem examination being held on 17. Two cases of this series, though still living, are included to bring out some point in diagnosis.

In the 14 cases in which we were able to obtain reliable information we found that the average length of service in France was 18.7 months. In one case the entire service was in Canada, and another saw 42 months in England only.

The past history of infection included, in order of frequency: Acute rheumatic fever, influenza, trench fever, tonsillitis, gonorrhœa, pneumonia, P.U.O., pyorrhœa, trench mouth and gas poisoning. While, as I shall point out, particular infections, such as acute rheumatic fever, are important, because they may define an area of lessened resistance to organisms in the heart valves, I have come to look upon a continued history of toxæmia, no matter under what name or names it may have been sailing, as extremely important in diagnosis because it demands that sub-acute bacterial endocarditis must be excluded as a cause. Case 11 of this series is one example of what I refer to; his official medical history while in the army included P.U.O., myalgia, V.D.G., conjunctivitis, influenza, trench fever, tonsillitis and urethritis in fairly rapid succession within a space of

two years. In such cases, where the man may have passed rapidly through the hands of several medical men who did not have the time or the facilities for a complete diagnosis, I have come to look upon such a nomenclature as P.U.O., myalgia, trench fever and influenza occurring in one case in a comparatively short time as being the individual interpretations of a prolonged bactæmia, such as occurs in this condition, and not the series of different infections which the names would seem to indicate.

We know bacterial or other injury to heart valves is like injury to the endothelium of the blood vessels, and is peculiar in its results, inasmuch as the reaction must occur in the streaming blood. The common effect is the formation of a thrombus on the endocardium of the valves; it forms an irregular cap of platelets with a little fibrin and a few leukocytes and red corpuscles. This occurs on a tissue in the case of the aortic valve which has no capillaries, but, if the thrombus contains living bacteria, leukocytes wander through the valve and young capillary blood vessels stretch out from the base of the valve through its substance until they reach the vegetation. Then one sees a true inflammatory process in progress.

It is claimed by some observers that toxins may produce the lesions of the endothelium of the valves; numerous experiments have been made, some with success, but on the whole the work is not convincing. The view most generally held is that of the bacteria reaching the valves by way of the circulating blood, and, from the situation of the early vegetations one cannot escape the impression that they lodge directly on the surface of the valve. This is no indifferent point, as it is evident from the inspection of any large number of affected hearts, that upon the line of closure is produced the first effect of bacterial activity; the valves do not come together at the very edges, but rather along the somewhat thickened fortified line a short way back from the edge, this line being supported in the case of the semi-

lunar valves by the corpora aurantii; thus it is along the line of closure that the film of vegetation appears; from here it extends so as to involve any other part of the valve, the heart wall, or chordae tendineae. How they lodge here has long been discussed, and it is generally thought that the mechanical beating together of the valves at this point catches up the bacteria in the blood stream and drives them into close contact with the tissues, so that they cannot slip by as they do over the smooth walls of the arteries.

Rosenow has revived the old theory that they reach the valves by capillaries. He states that injections of streptococcus viridans in large amounts can produce bacterial colonies in the substance of the valves beneath the intact epithelium and that they are seen surrounded by hemorrhages two to three days after the injection and well before any vegetations appear on the valve. This is easily understood in the case of old vascularized valves which have been the seat of a previous inflammation, but in the healthy non-vascular valve it is very hard to understand. The most convincing experiment is that of injecting a dog's heart with india ink; the aorta is clamped and the carotid injected before the heart stops beating; on opening and washing the aorta in water one finds the valves standing out white against a black background. The capillaries ending like a top of a hedge along the base of the semi-lunar valves and not penetrating into the substance. It is also to be noted that the line of closure around the corpora aurantii is not perfectly smooth, but is slightly corrugated, and this even after the india ink has been washed away in a stream of water so that the endocardium is perfectly clear; under the microscope there can now be seen minute granules of the ink adhering in these irregularities. Is it not possible and more probable that these areas form a foothold for circulating bacteria mechanically, just as they retain ink particles.

Organism Observed.—Our series of 24 cases showed 14 instances of infection by streptococci with varying degree of power of hemolysis, three of streptococci non-hemolytic, two of staphylococci and two of pneumococci; there were three cases in which cultures were not obtained, but which showed the typical post-mortem lesions. One soon comes to the conclusion that cases of endocarditis may differ, first, according to the bacteria present, and, second, according to the localization of lesions. In some cases the organism predominating was not the usual non-haemolytic streptococci or streptococcus viridans, but a strain of slightly hemolytic streptococci. This strain of streptococci showed hemolysis very different from

that produced by the streptococcus of puerperal septicaemia and the streptococcus pyogenes, haemolysis showing up one or two days later.

This type of endocarditis differs from others as regards localization in affecting first the aortic valves. In a few cases Dr. Murray states that the first signs were those of a mitral valve lesion, but the post-mortems revealed damage to the aortic valve, with the mitral showing only moderate degree of endocarditis. One must conclude, since all of these men had an average of 18.7 months' service in France, that strain plays a part in the localization of these organisms on the aortic valve. Another point of difference between this type of case and the streptococcus viridans type of endocarditis is that the vegetations involving the aortic valves are large, irregular, verrucose, vegetations showing ulceration of the vegetation itself with slight ulceration of the valve curtains and in some cases perforation of the curtains of the valve. Note: This process is not the same as acute ulcerative endocarditis, for at times the vegetations even showed calcareous deposits and the duration of the disease was six months or more. In several of these cases there developed in the course of the infection beautiful mycotic aneurysms varying from the size of a bean to that of a golf ball (see photos No. 1 and 2).

Pathological Investigations.—Sections of the heart valve showed the usual endocarditic masses, some showing fibrosis and young granulation tissues; others calcareous deposits, and in the majority of even the older ones there could be found, with a gram stain, colonies of bacteria near the surface of the vegetative mass. On sectioning the heart muscle from the base to the apex the interesting points brought out were the following: There were no true Aschoff bodies. In the majority of cases the muscle was clear at the base, but at the apex one could find fine perivascular infiltration of round cells and an occasional polymorph. In several of the hearts I located a fine colony of bacteria in the terminal small vessels of the heart near the apex, with accompanying inflammatory changes in the region of the vessel (see photograph No. 3). In other sections of the heart near the apex were found varying degrees of inflammatory changes (from early stage to a moderately advanced stage of fibrosis in a few cases). This fibrosis occurred in the region of, or following, the vessel in the one section from the case of staphylococcus endocarditis (the man was known to be ill and lived two months) showed irregular areas of acute polymorphous infiltration, the endocarditis was more the ulcerative type,

one portion of the vegetation ulcerating off in a ribbon-like fashion and plugging the coronary orifice; this man had also a rupture of the right ventricle (see photograph No. 4), an exceptional heart in our series of aortic endocar-

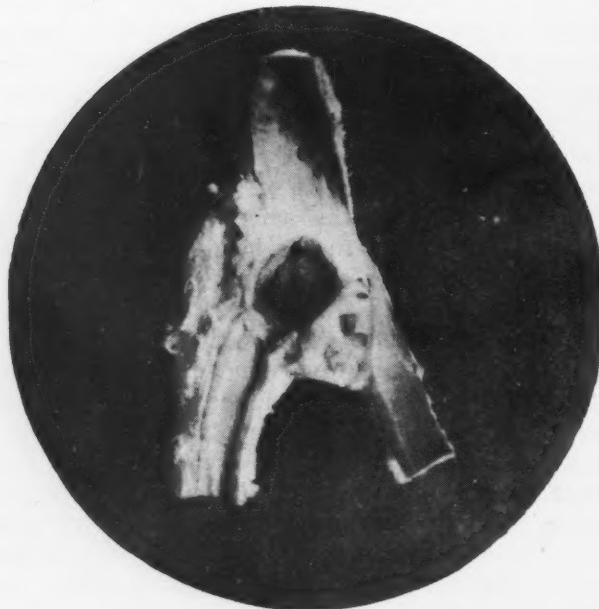


Photo No. 1.—Small Mycotic Aneurysm in the brachial artery just above its bifurcation. Note the small platelet mass at the mouth of the radial artery.



Photo No. 2.—Large Mycotic Aneurysm in the left axillary where it gives rise to the posterior circumflex artery. Note the thrombotic mass in its lumen.

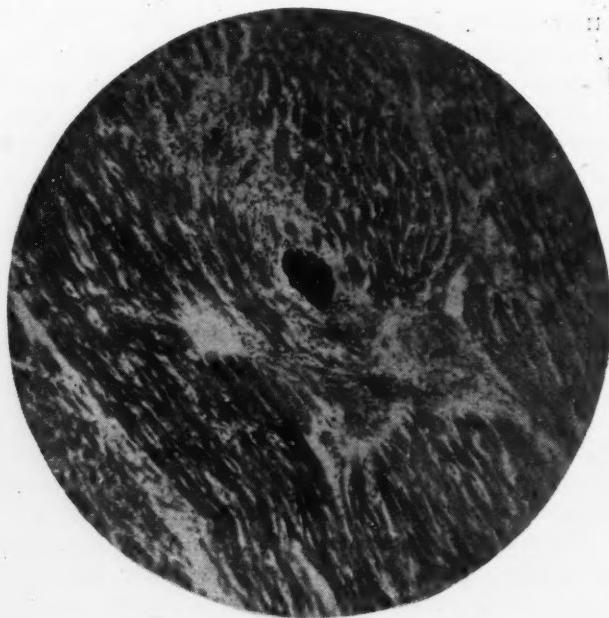


Photo No. 3.—Note the fine colony of bacteria in a terminal small vessel of the heart near the apex with accompanying inflammatory changes.

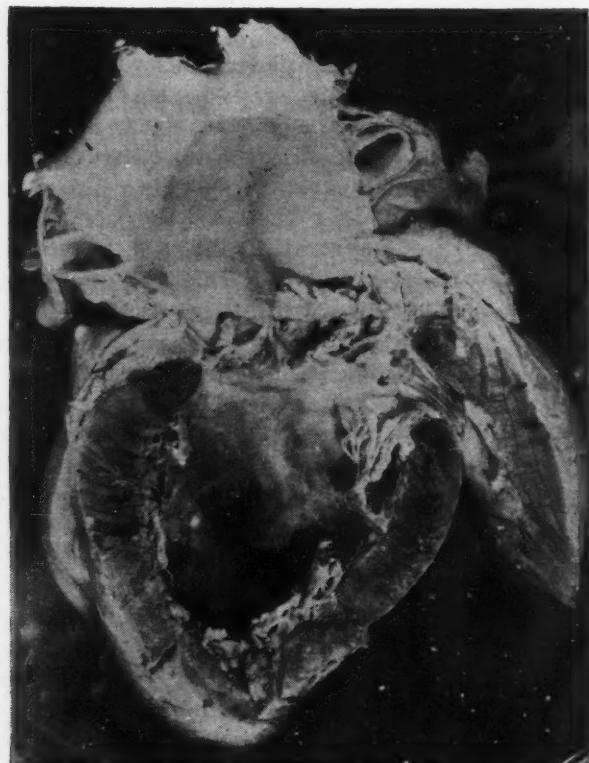


Photo No. 4.—Staphylococcus Endocarditis. Note that one portion has partially broken off and is plugging the right coronary artery.

ditis. The kidney lesion showed the pathological changes one finds in the streptococcus viridans type, but of a more advanced nature. In several kidneys I was able to demonstrate a small embolus with a colony of the bacteria growing in the artery of the kidney with ac-

companying acute polymorphous and round celled infiltration of the artery and surrounding kidney tissue (see photograph No. 5). One could find in the glomeruli little hyaline areas with one-half of the glomerulus adherent to Bowman's capsule and the other half apparently normal and trying to functionate, and in places complete fibrosis of numerous glomeruli, there generally occurred in the region of the

ditis Lenta and Chronic Infectious Endocarditis. You will see by the appearance of the post-mortem specimens that this group is closely allied to the acute ulcerative endocarditis, as in both types we have some degree ulceration of the heart valves, the difference pathologically, being merely one of degree. They differ clinically, in that acute ulcerative endocarditis is secondary to an active septic focus in some part of the body, and has an end result of pyemia with abscess formation in various organs; whereas in the sub-acute cases neither



Photo No. 5.—Small embolus with a colony of bacteria growing in an artery of the kidney.

glomeruli which showed this semi-lunar adhesion to Bowman's capsule, a round celled infiltration of the interstitial tissue close to the glomeruli.

The Spleen.—In all these cases the spleens were markedly enlarged, some weighing as much as 600 grams. They were the typical splenic tumors one sees associated with acute endocarditis. There is always a great swelling of the splenic pulp, which on the cut surface bulges or spreads over the ordinary malpighian bodies so as to almost hide them from view.

There also occurred the usual infarctions seen in the spleen, kidney, mesenteric vessels, brain and other organs.

These cases of endocarditis appear to be a half-day stage between the well-established type of ulcerative endocarditis and the subacute endocarditis.

Clinically these cases have been recognized under various titles: Sub-acute Bacterial Endocarditis, Sub-chronic Endocarditis, Endocar-

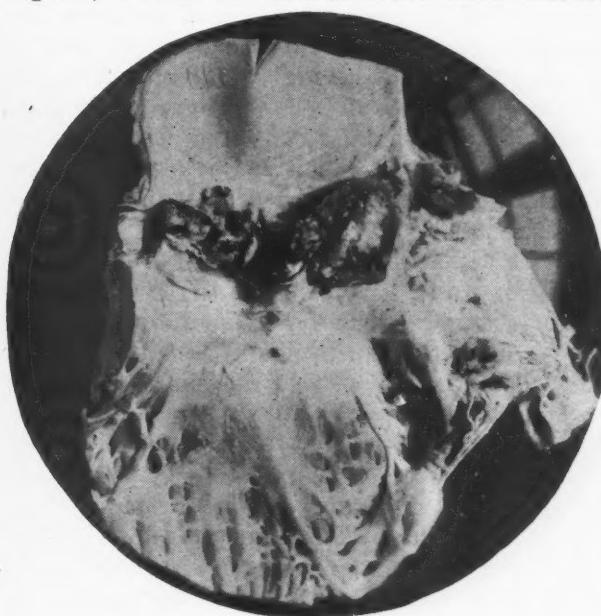


Photo No. 6.—A fairly typical heart of this series. Note massive vegetations on the aortic valves.

of these conditions prevail, as they follow some chronic or quiet infection, and the end result is not pus formation. I do not think that this distinction between the two forms should be insisted upon too strongly, for, although the variety and virulence of the organism may differ in the two types of cases, there is clinically much overlapping.

The important matter in these cases is their diagnosis. This must be from valvular defects on the one hand, and from acute rheumatic endocarditis on the other. Once it has been decided that an individual is suffering from this condition of sub-acute bacterial endocarditis it is almost certain that he will die in some short time, while in the other two types mentioned the prognosis is comparatively good.

In 1910 Schottmuller first individualized sub-acute bacterial endocarditis under the name of endocarditis lenta when he described five cases due to a green producing streptococcus. In the same year Libman described these cases under their present name, "sub-acute bacterial endocarditis." Later, in 1912, he showed that, while most of the organisms produced green in

blood agar plates, yet some did not, and others produced slight clearing, but yet that all are of low virulence. It was he who insisted that these cases of endocarditis must not be confused clinically with those due to rheumatic virus.

Libman had found the green producing non-hemolytic streptococcus or streptococcus viridans in 95 per cent. of his cases, the remaining 5 per cent. being made up principally of cases due to the influenza bacillus. In this series a very different result has been obtained, as 66 per cent. of the cases were caused by a hemolytic streptococcus. This difference may in part be accounted for by the individual interpretation of the appearance of a blood agar plate as to grades of color change, but the question arises as to the possibility of a varying geographical distribution of bacteria or of a mutation of the organism.

In his paper before the British Medical Association in June, 1920, Libman divided his cases into acute and sub-acute, the acute being those cases which have an illness of about six weeks and whose infection was due to the streptococcus hemolyticus, staphylococcus, pneumococcus, gonococcus, and the influenza bacillus. This has not been our experience. The average duration of our hemolytic streptococcus cases was seven months. The staphylococcus case of this series was under observation four weeks and had been sick for a much longer time. We also have a staphylococcus case now under treatment who has a clear history of three years toxemia and cardiac signs, with three positive blood cultures of the staphylococcus made at various times since coming under our observation in December, 1919. In the past week a fourth positive culture of staphylococcus has been obtained.* This surely must show the overlapping of the different groups.

One sees from this that the duration of these cases is from three or four weeks to three years or slightly more, and in tracing the history of an average case from its beginning, that there is at first a bacteriemia, in which the toxic element gives rise to indefinite joint and muscle pains, most often at that time giving rise to the mistaken diagnosis of myalgia, P.U.O., trench fever, rheumatism, acute rheumatic fever, neuritis, D.A.H., and other such names. As time

goes on the organism gains a foothold on one or more of the cardiac valves. This is the easier if the valves have been thickened as a result of previous rheumatic or syphilitic infection (possibly in the soldier cases there is to be considered the strain of carrying a heavy pack). In such cases the valves form a point of lowered resistance on which the infecting organisms easily gain a hold. In this period, unless frequent physical examinations are made so that the evidence of an advancing lesion may be noted, it would be very easy to mistake the case for one of a simple valve defect. Later on, with the onset of embolic phenomena, marked valvular signs and increasing toxemia, no excuse can be made for omitting blood cultures and for overlooking the correct diagnosis and prognosis.

To state a case and to bring out some of the difficulties in diagnosis at the period when a correct one is imperative, I have included Case 21, a boy aged 21, with a history of tonsillitis in 1915 and again in January, 1920. The second time followed by pains in the joints and muscles and thought to be acute rheumatic fever.

On account of some doubtful features in the case Dr. Lougheed was asked to make a blood culture on July 8, 1920, and a short chain streptococcus, slightly hemolytic, was found.

In his examination Sept. 4, 1920, the following were the points made out in connection with the heart: A faint systolic thrill at the apex. Rhythm regular. Impulse forcible and fairly diffuse inside the left nipple line. Dullness $3\frac{1}{2}$ inches from the midsternum to the left limit. There was a systolic murmur to be heard at the apex in all positions of the patient.

In such a single examination one might be led to make a diagnosis of a valve defect, namely, a crumpled mitral valve whose inflammation had reached a finality. A further examination, however, two weeks later gave again the above findings, and, in addition, a loud systolic murmur heard along the left border of the sternum and at the aortic cartilage; with the thrill at the apex; there was also a thrill felt in the subclavian artery. These further signs were taken by me to mean an extension to the aortic valve cusps. He is now fairly healthy in appearance; his temperature has been near the normal line for about two weeks, but if he goes along as the other cases in this series his course will be progressively downward.

While on the question of thrills as a point in diagnosis, it might be said that it is not common to find a real systolic thrill at the apex in a simple valve defect (one does frequently

*Since this paper was written this patient has died. Post-mortem examination showed gross vegetation in a patent ductus arteriosus, extending down and involving the pulmonary valves—and mural endocardium of right ventricle. There was also a mycotic aneurysm of the lower branch of the right pulmonary artery. This case will be reported later.

find a pseudo-thrill, systolic in time in a rapid actively beating heart, which does not mean disease of the valves). Further, that if a thrill is found it will appear late; the same may be said of aortic stenosis due to a chronic change. In this condition of sub-acute bacterial endocarditis thrills are frequent and appear early, and may be systolic or presystolic in time. One has only to look at these specimens we are showing to see the reason for this statement; it would have been strange, indeed, if some of these massive vegetations had not given rise to easily palpable thrills (see photograph No. 6).

Another point brought up in this case 21 is the extension of the progress from the mitral to the aortic valve. I have followed such an advance in a number of the hearts of this series, notably in Nos. 16 and 17, as well as in others not included in this series. It forms a valuable aid in diagnosis. Others again, evidently began as aortic affections and the mitral valve was involved secondarily. If we could see these cases early enough I am convinced that in all, some such advance could be noted, and we would at once have a clue to the type of disease. In some of these specimens you will note an advancing line of small vegetations along the aortic cusp of the mitral.

Having followed what might be called the ordinary or average case, it may give you a broader conception of this condition, if I detail one which, although of a common type, had a striking and tempestuous course from the beginning.

Such a one is case 11, aged 24, who developed hemiplegia while at his work as a machinist and was admitted to the hospital, where it was found that he had the physical signs of aortic disease.

With the evidence of an embolus sufficiently large to cause hemiplegia the signs of an active endocarditis of either the aortic or the mitral valve, the presumption was that the patient was suffering from either acute or sub-acute endocarditis of bacterial type, because in neither the rheumatic or the syphilitic forms are the vegetations sufficiently large to break off and block a large vessel. In this case a blood culture was made and an hemolytic streptococcus found.

The later history of this case was equally stormy, he had numerous emboli into various organs, one of these in the right kidney, simulated acute appendicitis and operation was debated.

Other and similar accidents happened. In case 8, where the patient was operated on for an acute abdominal state, an infarct of the mesenteric vessels was found.

In case 24 the patient died very suddenly;

post-mortem showed a large embolus to the brain and the presence of gross vegetation on the heart valves.

Such cases bring out the complicating results and the meaning of emboli in this condition. Other points of origin of massive emboli are very few, and except for thrombi from the heart chambers occur but rarely.

It is to be remembered that the onset of this condition is usually insidious, the patient being able to carry on with some form of light work until the toxæmia becomes too severe or, until some startling accident occurs which renders him helpless. I cannot refrain from remarking on case 14, who was referred to me Nov. 5, 1919. His history was that he had pains in the muscles and joints from November, 1917, but continued fairly active and came direct from his work as a barber to see me. He was then profoundly toxic, had extreme pallor with a yellow tint to the skin and conjunctivæ, his heart was large, the impulse diffuse and difficult to define, and he had murmurs throughout the cardiac cycle in all areas. He was sent to hospital at once, his progress was progressively downward, and a few days before his death he developed a severe continuous pain in the second right interspace near the sternum. He died Dec. 4, 1919, of rupture through an inflammatory exudate of the right ventricle, the culture in his case was staphylococcus.

In the photograph (see photo No. 4) of the heart, you will be able to see massive vegetations on the aortic valves, one piece of which has become partially broken off and is occluding the right coronary artery.

Coming now to the signs which are common to nearly all cases. Pallor is often early, even with a fairly high red blood count. I have attempted to note if the type of infecting organism was of any importance in determining its early appearance, and have thought that in the cases due to the hemolytic streptococcus it was sooner pronounced than with the other types. This was particularly the case in No. 16 of this series. In this patient the skin for weeks was of a remarkably translucent pearly whiteness.

Clubbing of the fingers is a valuable early sign in many cases. A similar condition may occur in valvular defects due to the rheumatic virus and other chronic changes, but in these conditions it is late in appearing, and is usually not so marked as in bacterial endocarditis.

The spleen is enlarged in most cases, quite often easily palpable, especially if there has been a fairly continuous fever or marked embolic phenomena.

Embolism, as you have already seen, is extremely common and its results form often one

of the tragedies of the disease. An examination of the specimens we are showing to-night gives one an idea of how easily a portion of the friable vegetation can become dislodged into the blood stream and block an important vessel. In practically all of the cases of this series infarcts occurred into the spleen and kidneys, in a few into the heart and brain, in case 8 into the mesenteric vessels, and in case 4 into the axillary and popliteal arteries giving rise to mycotic aneurysms (see photos No. 1 and 2).

Petechiae and Osler's nodes should be classed as fine superficial emboli, and they should be constantly looked for in doubtful cases. If systematically searched for every day, petechiae will probably be found. They are small hemorrhagic areas, usually with a white centre, and are most often seen in the soft tissues about the clavicles, but they may occur in any portion of the skin. Osler's nodes are not common, but when found are important from a diagnostic standpoint. They are seen on the palm of the hand or about the ends of the fingers or on the dorsal surface of the feet; they come with great suddenness, are painful and tender, at first reddish in color; they soon change to a blue or purple and then fade away.

The temperature varies greatly in its character in the different cases. In some it is continuous with marked daily fluctuations, in others weeks or months may follow with only insignificant rises. As a rule it does not go very high.

The lodging of an embolus in any organ usually sets up a febrile reaction, perhaps only as a single steeple in the case without much fever, but for a few days fairly violent fluctuations may occur.

In the heart itself, there are murmurs, presystolic and systolic thrills, as I have already pointed out. The cardiac impulse is usually diffuse and difficult to define, no doubt because the muscle is flabby and the systole weak. The left border is difficult to define, probably for the same reason.

I have noted in a number of these cases that after a certain stage of the disease has been reached, the transverse dullness of the heart may suddenly increase markedly. I have never seen such rapid dilatation in any other condition, save in some cases of severe myocarditis with the sudden onset of a pathological rhythm such as auricular fibrillation or auricular flutter.

Another interesting detail is the length of time for which patients may maintain the re-cumbent position in bed; even when marked dilatation of the heart has occurred they do not seem to have to assume the position of

orthopnoea; for example, the case I have already mentioned as having a staphylococcus infection for at least three years and as now lying with extreme dilatation of the heart at Davisville Hospital was able to remain flat in bed. These are casual observations, perhaps without very particular interest, but they have been of some diagnostic importance to me.

The treatment of these cases is very unsatisfactory and extremely discouraging, as almost all die. I have already pointed out the importance of a proper diagnosis, in order that they may be distinguished from somewhat similar conditions which have a more hopeful outlook. I have seen a great number of these cases in recent years, and in only two can I feel that the process has been checked for any considerable length of time. One seen by me at the Canadian Heart Clinic in England, March, 1917, was well enough to be driving a motor two years later, the other seen first about one year ago has been free from temperature for some months. Both are extremely limited in their efficiency and may only be in a prolonged bacteria free state, and further reinfection of the blood from the primary source of infection or from the heart valves may initiate a further activity, after which the course of their illness will be progressively downward.

In the treatment, transfusion of the blood serum, transfusion of serum containing antibodies against the homologous organism, vaccines and metallic salts of silver and mercury have all been used without the slightest influence in checking the active process. In two cases infected with streptococcus haemolyticus we saw a vaccine made from this organism clear up joint swellings and pain, but there was no evidence that the valvular inflammation was in any way influenced, as the patients' general condition rapidly deteriorated.

The time at my disposal will not allow of the discussion of other important features of this interesting condition, but I hope enough has been said to convince one that this very fatal infection is by no means a rarity.

Death, in these cases, is due either to sudden embolism to a vital part or to increasing toxæmia with cardiac failure.

To Recapitulate:

- (1) Preceding the actual occurrence of subacute bacterial endocarditis there is a longer or shorter period of bacteraemia during which the complaints are indefinite; general weakness, indefinite joint pains, dyspnoea, etc. These symptoms are a part of a general toxic state. At this time, except for mild or irregu-

lar fever, physical examination may reveal but quiet infection.

(2) The circulating organism gains a foothold on the valves of the heart. This may occur on valves which were previously perfectly normal, but it occurs much more readily on valves which were previously thickened as a result of old rheumatic or syphilitic inflammation. In the latter case, the thickened valves are not able to set up any great degree of resistance against the organism. The largest percentage of the cases belong to this class. Incidentally, this points out the important bearing upon any case, of chronic infections; this is specially true as regards these cases in which there has been a previous endocarditis.

(3) Having gained a foothold on the valve, the multiplication of the organisms, with the rapid deposit of platelets soon builds up a gross mass of vegetations which will give rise to thrills and to murmurs; since these are extremely friable, small or large pieces may become broken off, and emboli with infarcts in various organs, mycotic aneurysms, petechia, Osler's nodes, etc., will be seen.

(4) There may be little fever throughout the case. It may be seen occurring only with em-

boli, or the fever may be a prominent feature of the case and may go on for weeks or months uninfluenced by any form of medication.

(5) Suggestive features are pallor, clubbing of the fingers, and embolism; the latter may show in a large or small vessel, may be superficial, as demonstrated by the petechiae and Osler's nodes.

(6) Blood cultures may be positive on the first examination, but usually a number of samples of blood must be taken, as the blood stream is often bacteria free for long periods. A reinfection may coincide with the appearance of emboli. Cultures taken at these times give the best results.

(7) Treatment is unsatisfactory. One reason for this is that the reaction in the heart valves is insufficient to overcome the local deposit of organisms; these by persisting and multiplying continually reinfect the blood.

We are indebted to Col. J. M. Nettleton, Director of Medical Services, "D" Unit, S.C.R., and to other members of the Staff for kindly assistance; also to Dr. W. R. Robertson, pathologist to the Toronto General Hospital, for the micro-photographs shown.

TREATMENT OF CARCINOMA OF THE ANUS AND RECTUM

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IN preparing this paper I have taken into consideration an experience gained by seeing over one hundred cases, treated by various surgeons and myself.

Out of these one hundred cases only 28 per cent. admitted consideration of radical operation.

There have been a great many different operations devised for the treatment of carcinoma of the anus and rectum; to be mentioned are: "Excision by the sacro-coccygeal route" (Kraske operation), "excision by the vaginal route," "excision by the perineal route" and "excision by the combined method" (abdomino perineal operation). When a radical operation is impossible, a colostomy

should be done at once and radical operations that retain the anal canal are pathologically unsound.

The only sound radical operation is the two stage operation, colostomy, and later, extra or intra peritoneal excision, either by removing the coccyx, or with it, the two lower pieces of the sacrum, depending upon the extent of the growth upwards. This should be ascertained by internal examination, before the radical operation is commenced.

The first stage in treatment consists of an internal examination of the interior of the abdomen and in the doing of a permanent colostomy.

The abdomen is opened by making an inci-

sion through the outer part of the left rectus muscle, a little above the mid point, between the umbilicus and the symphysis pubis. The incision should be long enough to allow the operator to pass his hand into the abdomen, so that he can make a complete examination of all parts for extension or secondary growths. In examining, one should first palpate the growth in the rectum to make out if it is attached to the bladder in male patients or to the uterus in female patients; then the hand should be passed behind the growth to see if one can feel any enlarged glands behind the rectum in the sacral cavity. After having examined the contents of the pelvis, the hand can be passed upwards to examine the lumbar glands for signs of enlargement. Lastly, the operator should palpate all the abdominal surfaces of the liver, that are accessible from the interior of the abdomen for secondary growths. If there are secondary growths in the liver, enlarged lumbar glands, or the growth has extended to the bladder wall, then the only treatment is a colostomy, but, if only the glands in sacral cavity are enlarged, even if the growth is attached to the uterus, the second stage of the radical operation, that is, resection of growth, may not be contra-indicated.

In doing a colostomy, a point about the middle of the sigmoid should be chosen for the opening. This will leave a portion of the sigmoid loop between the descending colon, and the opening which will act as a pouch, and will retain a large quantity of faecal matter for several hours, while the patient is in the upright posture. To fix the loop in position, it has been my custom to use silk or silk worm gut, instead of a glass rod. I take two large curved cutting needles, threaded with number three silk. I then pass the first needle through the anterior layer of the rectus sheath, rectus muscle, posterior layer of rectus sheath and peritoneum, on the inner side through the meso-sigmoid, then up on the outer side through the peritoneum, posterior layer of rectus sheath, rectus muscle and anterior layer of rectus sheath. I do the same procedure with the second needle, one and a half inches below the first. Next I tie the two inner ends of the silk together, then lift up colostomy loop until I have just the width of bowel above the skin, and fix in that position by tying the two outer ends. In sewing up the upper part of the peritoneum, great care is necessary to leave only three-quarters of an inch between the upper silk ligature, through the meso-sigmoid and the lower stitch in the peritoneum. The rectus sheath and skin should be sewn so as to leave the same amount of space for the upper loop,

as previously described in sewing the peritoneum. The lower part of the wound should be sewn up in the ordinary way. The skin around the intestinal loop should be stitched to it by fine silk, and all the skin sutures removed in six or seven days. The colostomy opening should be made in the loop transversely four days later, and the whole thickness of the sigmoid cut through in ten days, leaving two openings, an upper, which is to be the artificial anus, and a lower which leads down into the rectum.

The second stage of the radical cure, should be performed in about a week or ten days after the first operation. The patient should be prepared in the ordinary way, with this addition, that the rectum is washed out daily with normal saline, through the lower opening for three or four days. If the vagina is involved the patient should have vaginal douches of lysol for the same length of time. When the patient is anaesthetized, he or she should be turned on the left side, with the right leg flexed, and drawn up towards the head, and the left leg extended on the table. The operator should now take a cutting needle threaded with number three silk, and pass a purse string suture, around the anus and tie tightly, to prevent any discharge from the rectum while the operation is in progress. The surgeon changes his gloves, while the site of the operation is swabbed over again with 2 per cent. picric acid in alcohol, or with iodine. The incision should commence at the upper border of the third piece of the sacrum, pass down the middle line over the coccyx, and then circle around the anus, at least one inch external to the purse string suture, back to meet the first incision, just above the anal opening. From the abdominal examination, at the previous operation, one has decided whether he can remove the growth, and a sufficient amount of the bowel, at least three inches above the growth, by either removing the coccyx, or, if necessary, the two lower pieces of the sacrum. The former is generally sufficient in female patients, but the latter step has often to be taken in male patients. One now dissects out the anus and rectum from below upwards, and a portion of the vagina can be removed, if it is involved by the growth; next remove all the fat and glandular tissue in the hollow of the sacrum. If the growth is firmly attached to the uterus the latter can be removed through the same incision. The growth may extend above the reflexion of the peritoneum, if so, the peritoneal cavity will have to be opened, in order to cut through the bowel sufficiently high above the mass.

To remove the anus, rectum, and growth, apply two large clamps about three inches

above the upper border of the cancerous mass and cut the bowel across with the actual cautery, as close as possible to the lower surface of the upper clamp. The lower piece can now be removed. The lower end of the upper piece should be invaginated by two purse string sutures of number three silk, care being taken not to allow the needle to pass into the interior of the bowel, an accident which might be the means of infecting your wound. If the peritoneum has been opened, it must be closed by stitching its anterior layer to the wall of the bowel, leaving the invaginated end extra peritoneal. All blood vessels having been ligatured, and the vagina repaired, if necessary, the wound is sewn up in the ordinary way without drainage. In some cases, where infection has extended through the growth to the lymph spaces outside the bowel one must employ drainage by putting a tube in the lower part of the wound, or, in female patients, through an opening in the posterior wall of vagina.

After Treatment

The patient should be instructed to take purgatives only if necessary; paraffin oil is to be preferred. The bowels should be regulated to move each morning by a careful diet. After each evacuation the patient should be instructed to wash out the upper loop with warm water. The lower loop or sac should be washed out at least every third day, as there will be a certain amount of mucous discharge. After the daily lavage, a small pad should be placed over the opening, and the patient will usually be quite free from discharge for the next twenty-four hours.

Conclusions

This type of colostomy is the most satisfactory. It does not allow the continually exuding of faeces from its opening, for the following reasons: (a) The opening is surrounded on both sides and above by the rectus muscle, low by the permanent silk ligature. These structures have a certain amount of control somewhat similar to the sphincter muscle. (b) The pouch left in the upper part of the sigmoid, after once being emptied takes a great many hours to fill again. (c) When the patient is in the standing position the rectus muscle is more or less on tension, and helps to guard the opening.

Other advantages gained by this radical operation are: (a) The mortality is almost nil as compared with that of some of the other operations, e.g., abdomino-perineal, of which the mortality is 60 per cent. or over. (b) It allows one to remove the growth by dissecting wide of it. In some of the other operations where a resection is being done and an anastomosis of the two cut ends being made, one often does not keep far enough away from the mass and consequently a recurrence results. (c) In some of the cases of resection and an end-to-end anastomosis, the two ends are so put on tension that the stitches cut out, and thus allow the faecal matter to pass over a raw surface. This surface absorbs a certain amount of the noxious material of the faeces, and as a result the patient may succumb to a poisoning therefrom. There may also be produced a fibrous stricture, troublesome to a degree and difficult to keep dilated.

CHRONIC PAIN IN THE RIGHT ILIAC FOSSA

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THE attention which has recently been given to conditions associated with chronic abdominal pain has started lines of thought in many directions regarding fundamental conditions which may result in the development of chronic abdominal disorders. The last few years have developed a more thorough understanding of minor intestinal upsets and their earlier appreciation as warnings of a more grave lesion than was formerly suspected. There are many patients who complain of biliary attacks, dyspepsia and abdominal pain, who are persistently taking various mixtures, various diets, who are ever placing themselves under various new regimes, with results which are not only disappointing, but heart-breaking.

That such a state of affairs exists is due largely to a preconceived idea on the part of some physicians that the patient with indigestion has a disorder for which nothing definite can be done, and in such individuals the treatment has been simply symptomatic. That such a state of affairs should continue to exist not only reflects very discreditably on our ability to make a diagnosis, but emphasizes most strongly the fact that such an individual complaining of indefinite gastro-intestinal disturbances must not merely be given a placebo, but must have a most careful, thorough and painstaking examination in an effort to arrive at a diagnosis. That it is impossible to arrive at a definite diagnosis in a certain percentage of such cases is perfectly true, but if we use all the means at our disposal we can recognize fundamental pathological states which can explain the patient's semi-invalidism in a very large majority of cases.

The early history of such individuals is of extreme importance, because one is forced to believe that such a condition cannot occur in a short space of time. There is usually the history of gastro-intestinal upsets early in life, and that these were aggravated by severe physical and mental effort.

The particular type of individual to whom I wish to direct your attention is one who complains of gastric distress and abdominal discom-

fort; one, who, on a physical examination shows tenderness in the right iliac fossa. The pain and tenderness are not always associated. The proper appreciation of the significance of this association, or dissociation, of pain and tenderness in every abdominal condition, prevents many unnecessary abdominal operations in extra-peritoneal involvements, particularly in those situated just above the diaphragm. An individual may have attacks of acute pain associated with a certain amount of gastric distress—a feeling of uncomfortableness and fullness—but that pain will not be sharply localized; it will rather centre about the umbilicus, while physical examination may reveal tenderness in the right iliac fossa. I wish most strongly to state that such a case is very rarely suffering from so-called chronic appendicitis. That chronic appendicitis exists one cannot doubt, but that chronic appendicitis can exist as a clinical entity in the absence of any history of a previous acute attack, is very unlikely. That such is the case must be apparent to all who have had to do with chronic abdominal disease and who have reviewed the histories of the many patients who have had their appendices removed for a chronic gastro-intestinal disturbance without any amelioration of their symptoms. No doubt such cases are often suffering from a cholecystitis which has been overlooked, but there is a fairly definite and not inconsiderable group of cases in which the pathology is situated in the right iliac fossa. It is to this type of case that I wish to direct your attention.

The affections or disorders which can exist in the right iliac fossa, apart from genito-urinary disturbances (which do not enter into this discussion) have to do with abnormalities in the caecum, appendix, ileo caecal valve, and the terminal ileum. We must realize that one is never justified in making a diagnosis of chronic appendicitis in the absence of the history of an acute attack, unless he has satisfied himself by all the means at his disposal that the other three possibilities are not factors in the patient's ill-health.

Much has been written recently regarding the incompetency of the ilio-caecal valve, or what is more accurate, the ileo-caecal sphincter, because its function in preventing the regurgitation of caecal contents into the ileum comes about as the result of muscular spasm of the ileo-caecal sphincter. Operations have been devised whereby such incompetency may be remedied.

However, it is a well recognized fact that there are many people having incompetent ileo-caecal valves proven by x-ray who suffer no inconvenience whatever. Thus one is forced to believe that there is some factor in addition to the incompetency of the sphincter.

On radiographic examination, one finds that the subject with an incompetent sphincter has in addition a recurring ebb and flow of the barium from caecum to ileum and back again, for varying periods of time, with, in addition, definite radiographic evidence of caecal retention. The explanation of this, then, seems to be that the musculature of both the ileum and caecum is incapable of maintaining the onward flow of the intestinal content. In other words, there must be a defect in the muscular activity of that portion of the gastro intestinal tract. The cause of such defect is at present more or less indefinite. The pathological findings in such instances will, however, be dealt with subsequently.

Symptomatology.—While it is not always possible to make a positive diagnosis from clinical examination alone, yet if one is painstaking the condition will at least be suspected, and will either be confirmed or disproven by radiographic findings. Those affected with this altered function of the caecum have usually suffered from ill-health and from many physicians over a period of years. Their complaint is, that of never feeling absolutely well and that of having had from time to time, acute exacerbations characterized by pain, abdominal distention, with probably nausea and vomiting; on physical examination one finds tenderness in the right iliac fossa.

In a large percentage of these cases, this relationship to physical and nervous strain is so definite that many such individuals are classed as neurasthenics. They have rarely the feeling of extreme well-being; are relieved by rest and change of environment, but the symptoms will recur as soon as they return to their usual occupation. The time of occurrence of their distress is of extreme importance. It is very rarely that breakfast is enjoyed; in fact, in many individuals the history is elicited that on arising in the morning there is a feeling of abdominal discomfort. This time of occurrence may serve to differentiate such chronic lesions from those of the upper abdomen, such as cholecystitis and

gastric or duodenal ulcer. Physical examination will reveal very little except tenderness (which is not severe) when the right lower quadrant of the abdomen is palpated.

Radiographic findings: Radiographic examination of such individuals is not complete unless, in addition to the usual barium meal, the individual is given a barium enema. During the progress of the meal there is usually a very marked evidence of an ileostasis, associated with varying degrees of caecal and appendicular retention up to one hundred hours, or even longer. When the enema is given there is found to be a varying degree of incompetency of the ileo-caecal valve with a marked ebb and flow between the caecum and ileum. In one instance it was impossible, by means of x-ray, to demonstrate the communication between the caecum and ascending colon, despite the fact that an excellent shadow was obtained of the hepatic flexure and the remainder of the large bowel, the obvious inference in such a case is that the obstructed area shows as the result of pericholic adhesions.

Diagnosis—In the past, with such radiographic findings, a generally accepted diagnosis would have been "chronic appendicitis, with adhesions." The tragedy of surgical intervention in such cases must be well known to all of you, if your operation consisted in appendectomy, and the breaking down of adhesions. Such cases, once they have had their appendix removed, become repeated subjects for operation for intestinal adhesions; the futility of this procedure is evident.

Given such a clinical history, and the above radiographic findings, a complete diagnosis would appear to be atony of the terminal ileum and caecum, with incompetency of the ileo-caecal valve.

Treatment and Operative Findings.—Unfortunately in these cases a minor operation cannot be advised. No less a procedure than a resection of the terminal ileum, caecum and ascending colon to a point proximal to the hepatic flexure will produce the desired clinical result. When the abdomen is opened, the pre-operative diagnosis is confirmed by finding the lumen of the ascending colon compromised by bands of adhesions. The caecum is dilated and thin-walled, possesses none of the tone or elasticity seen in a normal bowel. When the walls are pressed together there is not that rapid return to a normal contour which is characteristic of a healthy caecum. It rather lies flaccid, with a tendency to remain in a distorted shape. As an etiological factor there is, in the majority of cases, no gross lesion present, but in some cases one finds masses of calcareous mesenteric glands—tombstones of a pre-existing tuberculous adenitis. In such in-

stances it is not inconceivable to believe that the motor innervation of the caecal musculature has been interfered with, and thus, is produced, the lesion found. When, by operation, the diagnosis is substantiated, a resection of ten to fourteen inches of the terminal ileum, caecum and ascending colon is done to a point where one is sure that healthy large bowel is existing. In one instance it was necessary to remove the large bowel to the mid-point of the transverse colon, and it is surprising to note the definite line of demarcation between normal and abnormal large bowel. In one instance, where a primary side to side anastomosis had been done between the ileum and the large bowel, the caecal and ileal stumps both dilated, resulting in retention of intestinal contents, and a recurrence of the symptoms, making it necessary to do a resection of the anastomosis. Since this experience we have never done any anastomosis other than an end to end, using Balfour's method of splitting the anti-mesenteric wall of the ileum, in order to create a stoma sufficiently large to allow of an anastomosis with the large diameter of the colon. We have had such anastomoses subsequently radiographed, and as far as function at the site is concerned, it leaves nothing to be desired.

In conclusion let us say:

First—That it is earnestly hoped that a presentation of this idea will at least cause us to hesitate before making a diagnosis of chronic appendicitis with adhesions, and removing the appendix and breaking down the adhesions through a small incision which permits of no exploration.

Secondly—That when a patient who has had such an operation done returns for treatment, we should be very guarded and should investigate the situation with all the means at our disposal before we advise an operation which will again consist in simply breaking down adhesions.

Thirdly—That atony of the caecum and terminal ileum is a clinical entity due probably in some cases to a pre-existing tuberculous adnitis interfering with the innervation of the caecum, due in others to some unknown cause resulting in altered functions of the ileo-musculature, because with one exception histological examination of tissue removed shows no evidence of an inflammatory reaction nor of muscular atrophy.

Fourthly—That an end-to-end anastomosis between small and large bowel is the operation of choice when such a resection is necessary.

Fifthly—That the clinical result is surprisingly good, and completely justifies the formidable surgical procedure necessary for its attainment.

THE TREATMENT OF THE PSYCHONEUROSES*

GEO. F. BOYER, M.B., M.D.,

TOO often in the past we have been content to label the psychoneurotic patient with a name and then empirically prescribe. After having made the diagnosis of psychasthenia, neurasthenia, hysteria or anxiety neurosis we have been too content to prescribe physical and mental rest, or electricity and massage with change of environment or some other part of the armamentaria in vogue and pay little heed to the underlying psychological processes which have driven their prey to earth. We may hope that time will smooth out the ruffled consciousness and problems of these poor victims of circumstances. In selected

cases these simple methods may suffice and at least for a time accomplish a happy solution; but too often this does not take place and the patient sinks into a more chronic state of invalidism. It is not sufficient to diagnose that in some cases these types are but sub-normal people, defectives, morons, heberphrenias, etc. This is but an admission of weakness, and excuse for failure in dealing with some of these types. It is here that the controversy is staged between the neurologist and psychiatrist, as to definitely defining each his own domain. If the normal individual is subject to disturbances of consciousness and composure under the stress of emotion so much more so is the person who is less fit mentally to cope with the problems of life and their resultant mental dis-

*Read before the Academy of Medicine, Toronto, January 11th, 1921.

turbances. The problem is more efficiently dealt with and best solved by making the patient better able to understand himself.

In order to better discuss the subject I have sub-divided the treatment into sections that to me have seemed to be essential in dealing with the psychological mechanisms in these cases.

(1) The sympathetic appreciation of the patient's problems.

(2) The careful detailed physical examination of the patient.

(3) The discussion with the patient of instincts, emotions, associations and repressions.

(4) The realization by the patient that he has limitations of his mental faculties just as arbitrary and as absolute as limitations of his physical activities.

The patient must have full confidence in his adviser and physician. In this respect the respected and honored family physician often has an unique opportunity to effect a "cure" by his firm assertion that a specific phase in his case is a fact. The patient, accepting this, sets at rest his complexes. Years ago Dubois made the statement that the psychoneurotic is "cured when he believes he is cured," and it is upon this hypothesis that an arbitrary statement sometimes effects its result. As soon as he ceases the introspective search for defect he ceases to find rationalization for his conviction of disability. The physician must be able to inspire respect and trust. He must be sympathetic, patient, self-possessed, understand human nature because of his association with his fellow-men and his knowledge of the world. His conversation must be plausible and reasonable, and he must have a special interest in his calling. If these qualities are present a full investigation of the patient's history and his confidence and co-operation are assured. The patient's earliest impressions in childhood, his early ideas of right and wrong, his fears, his joys, his failures, impulses and difficulties, must be listened to and inquired into to gain knowledge and give the physician facts upon which to base his deductions and explanations. This investigation of history gives the patient a feeling of confidence which in turn usually leads to a very essential factor, namely, self-negativism. The self-negative patient will "open out his heart" and tell his problems and their consequences with the conviction that he has an understanding ear. All of this takes time; but it is essential in gaining knowledge of the instincts and emotions that have driven the personality. We learn of the child with the early over-development of the tender emotions showing themselves in incidents in every-day life; of disturbed behavior from sympathy or fear. Or perhaps we learn of the over-develop-

ment of self-positivism in the precocious child who perhaps later will be the subject of bashfulness, which is the confusion of consciousness resulting from a conflict between self-positivism and self-negativism. The wide reputation of some shrines and the confidence of the patient are often the mainsprings of assistance in effecting their "cures." This perhaps applies more particularly to the hysterie who is always susceptible to suggestion, providing it is to his interest to re-act in a given way. The hysterie has a phase which can be summarized at one period of his consciousness by a concealed, illicit, morally untenable motive. This has frequently been shown in the soldier confused by the simple complexes of fear which he misinterprets as cowardice and then reasons logically that punishment will be meted out to him and frequently a conversion hysteria develops and he is carried from danger with an hysterical paralysis or contracture sometimes after the slightest initial injury. It is not sufficient to use electricity, chloroform, or massage, and leave his complexes to take care of themselves and remain unsolved or become associated with civil life. The thorough history of such cases, the discovery and bringing to places of importance, preceding incidents, is essential in dislocating his rationalization and in gaining his confidence. The full and free discussion of his daily problems and their development is essential in all psychoneuroses. The psychoneurotic is often in danger of arguing himself into a position of inferiority in his own eyes and he seeks rationalization in slight physical ailments. Many of the minor gastric, cardiac, and sexual maladies or irregularities are as it were seized upon by his consciousness to justify to himself the full confidence that he is suffering from gastritis, disordered action of the heart, or impotency. As a result he sets up a deep seated and well rationalized anxiety or fear which only aggravates his physical condition.

It is essential before anything further is undertaken in the examination that a careful and full physical examination be made. It is not sufficient to examine the heart and pulse of a patient and assure him that his heart and life are safe. This has probably been done repeatedly on previous occasions. Too often the diagnosis of neurasthenia has been made in a casual way and the admission is made that the patient has "nerves" and he is subjected to rest. This may suffice, but more often it does not. The examination should be as exhaustive as possible and in many cases cause will be found for disturbance in highly emotional personalities in minor physical defects. Perhaps before we make the diagnosis of a psychoneuro-

tic condition too readily we need to know a great deal more of the effects of infections generally. Adler has brought to prominence the neurotic constitution and the organ inferiority hypothesis. I am not an adherent of the too often followed doctrine that all psychoneurotic patients should have all physical defects corrected by radical surgical procedure. Many of the so-called splanchnic or sexual neurasthenias are only made worse by laparotomy and removal of doubtful appendix, tube, or ovary, or dilatation of cervix or urethra. These procedures sometimes do relieve temporarily, and then the symptoms return, not because of the return of the offending condition, but because of the susceptible personality. These patients are often made worse by being operated upon. The examination cannot be too exhaustive, for by it alone often the patient is convinced that the disturbing factor will be found and remedied, or if not found the patient may say, "Surely only an unfounded anxiety." It may be in time that all of these types will be placed in the category of organic disease through the advancement of more thorough and modern investigation. We have only to remember our own cases of early or incipient disseminated sclerosis, obscure infections of the nervous system, brain tumors, syphilis of the nervous system, old injuries of the brain and cord, and many other defects, to learn with what ease we have too often been suspicious or made the diagnosis of, neurasthenia, hysteria, psychastenia, and the neuroses in the past, only to be proved wrong at a later date. It is quite a natural pitfall, but one we must avoid if possible.

Having established to our own satisfaction that the physical occupies a very subsidiary, or no part, in a given case, we are then in a position to make suggestions.

Freud in his pioneer work on psychoanalysis pointed to the instinct of reproduction and the emotions relative to sex as the driving force in all, but surely he has made his exhaustive analysis of one only of our chief instincts! We have at least another of equal potentiality in self-preservation. This instinct is guided by the emotions of fear and flight, but fear and flight seem contrary to the recognized law of man because of their confusion with cowardice, hence we have the fundamentals for conflict in the un-analytical. Civilized man must bring the two instincts of sex gratification, and desire to avoid pain, under control. They are controlled by the logical and idealistic aspects of consciousness, just as the thalamus (which may be their centre) is subjected to the control of the cerebral cortex. As long as harmony exists the course of events is orderly. The in-

stincts assert themselves at times and at other times are subservient, but when this relationship is disturbed, mental conflict becomes manifest and the patient is a fit subject for a conversion hysteria or anxiety neurosis. Perhaps in time, minute changes will be found in the basal nuclei which will alter the functions under psychological stress helping to explain perhaps some of the disturbances of emotion.

Concluding that the patient's condition is due to mental conflict, we must try to isolate the emotion conflicting with the comfortable course of consciousness. Many of these cases are given to dreams of their repressions—that is, when the censorship of consciousness is lost in sleep, the emotions take charge, and perhaps imprint themselves upon the consciousness as a dream. This is often best seen in the simple dream of the soldier. The battle dream when the scenes of battle are rehearsed with tenfold detail and horror are but the repressed fears of the working hours. This of necessity brings us into contact with suppressions and repressions. When an incident simply fades into the state where it cannot be recalled to consciousness it is forgotten; but when an incident or action clashes with the law of society or practise, as understood by its host, our active effort is made to suppress it and this creates a repression. Unrest and rest "cannot live peacefully in the same host," and so the individual exists in a disturbed state or like "a house divided against itself."

It is the reasonable, rational discussion of instincts and their emotions on the one hand, and the ideal, and logical aspects of consciousness, on the other, that will lead to the better understanding of these cases by themselves. They will be better able to cope with disturbances such as loss of sleep, tremors, restlessness, pulse disturbances, etc., after their complexes have been "dug up" and "aired." If the neurotic is allowed to continue his repressions and other abnormal defenses and maintain argument and "logic tight compartments" in his consciousness, he will always have sufficient complexes to produce the symptoms and signs which bring him to the doctor. If he is treated empirically with rest, occupation, seclusion, etc., time will help efface the complex and it may not return, if it is not recalled sufficiently vividly in the daily stress of life. The complexes of sex in psychoneurotic individuals clash frequently, of course, with our ideas and accepted teachings of society and religion, and as a result morbid anxieties and hysterical phenomena often result. The simple method of mental catharsis is often helpful, for it creates an atmosphere free from repression, a relief post to the patient, where he can discuss his

most intimate complexes with a trusted mentor. The maintained repression narrows down the stream of consciousness and so makes the transient amnesia possible and troublesome; we cannot naturally devote our whole consciousness to any subject if a great part of it is devoted to maintaining logic tight compartments. If these are fully discussed and freely explained we have made possible, useful work, play, or any physical diversion, for we have aided the patient in giving to that diversion the greater part or all of his attentions and consciousness. The patient must learn that he has a limitation of his mental faculties just as arbitrary and as absolute as are limitations of his physical acti-

vities. He must be re-trained to depend upon himself within these limitations and to know the dangers of exceeding his points of endurance. It is difficult to treat this type of patient in his home in the environment where many of his complexes were developed and rationalized; therefore, the properly organized institution is the best effective place for dealing with them. The institution should have all modern appliances for diversion, and all conditions inviting its occupant to restful mental activity and moderate physical exercise. The greatest asset to the institution, however, is the physician who discusses, examines, explains and stimulates his patient and is not merely content to make his sanitarium a harbor of passive refuge.

High Blood Pressure Stasis

Whatever difference of opinion may exist regarding the factors concerned in the production of high blood pressure, Arthur R. Elliott, Chicago (Journal A. M. A., May 28, 1921) says that general agreement must concede that when such a condition has come to pass it represents a state of circulatory strain. The net result of persistent high arterial blood pressure, after due allowance is made for physiologic factors of adjustment, is overwork to the dynamic side of the circulation—the heart and the arteries. For a variable period, compensatory adjustment proves adequate to maintain circulatory equilibrium; but in the course of time, demands on the heart resulting from the stress and strain of a continuously elevated blood pressure outrun cardiac adaptability, and exhaustion of the heart muscle supervenes with circulatory failure. The form of heart failure most frequently encountered is a gradual exhaustion of myocardial tonus, with the characteristic syndrome of progressive asystole and falling blood pressure. In still another group of cases the blood pressure formula remains but little altered, despite the steadily increasing circulatory embarrassment; and until the inevitable antemortem fall in pressure supervenes there exists the anomaly of a failing ventricle with a sustained blood pressure. The name "high blood pressure stasis" has been applied to this condition. High pressure

stasis appears to possess certain interesting characteristic features. Chief among these are rapid pulse, gallop rhythm and pulses alternans. Auricular fibrillation rarely, if ever, occurs. Pulsus alternans is a frequent development in these cases and, once present, is usually permanent. One of the most interesting and constant physical signs observed is the presystolic gallop rhythm. When once established it never wholly disappears, and it has proved a sign of grave significance. In high pressure stasis occurring as one of the phenomena of the terminal stage of chronic nephritis, blood nitrogen accumulation may attain high figures; whereas in non-nephritic cases but little waste nitrogen retention has been observed. The most striking characteristic of the blood pressure formula is marked and persistent elevation of diastolic pressure. A rather interesting feature of the state of advancing stasis is the general absence of edema. The nature of the causes which contribute to bring about this form of circulatory failure renders the prognosis a serious one, increasing in gravity according to the degree with which the vicious circle as between heart and arteries becomes more firmly established. There are but three measures of treatment that appear to exercise any control in this condition, and they are rest, venesection and digitalis.

Retrospect

ON THE INFLUENCE OF A DIET WITH HIGH PROTEIN CONTENT ON THE KIDNEY

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The kidneys play the chief role in the removal of the solids resulting from the various processes of metabolism. Water and carbon dioxide can, and do, escape in quite large amounts through the lungs and skin, but the waste products of protein metabolism, urea, uric acid, creatinin, and other substances of unknown composition, can be excreted only in solution in the urine. Through the kidneys also escape various substances of a toxic and non-toxic character, which may be introduced into the body either by accident or disease. Thus mercury, arsenic, and the toxins of disease processes, pass through the kidney, and if present in sufficient concentration may damage the organ, giving rise to cellular degeneration.

It is a matter of common knowledge that the heavy meat eater is a frequent sufferer from vascular disease, hypertension and nephritis, and it has been suggested that the hypertension itself is due directly to the high protein intake. Mosenthal, however, shows that high protein diets for periods up to four weeks cause no constant change in the blood pressure, and that low protein intakes also fail to affect the systolic pressure, although in both cases the blood nitrogen figures show marked variation during the periods of unusual feeding. This would seem to indicate that the increased pressure of hypertensives is due not to an excessive nitrogen metabolism, but rather is secondary to some other condition. From the standpoint of symptoms, however, these cases show marked improvement under restricted protein intake: the morning headache disappears, the nocturnal polyuria is decreased, and the general health improves, showing the benefits of protein restriction.

In this respect the recent work of Squier and Newburgh is of more than ordinary interest. In 1919 Newburgh claimed to have caused

nephritis both of the sub-acute and of the chronic type in rabbits, by feeding large amounts of protein for periods ranging from one to twelve months. The diets contained two to three times the normal amounts of protein, in some cases as egg white, in others as casein, while in a third group it was given as a vegetable protein (soy bean). Careful urine examinations showed albumen, casts, and often red blood cells soon after starting the diet, and after three to twelve months' autopsy showed nephritis of varying type and degree, according to the variety of protein used in the food. The animal proteins seemed to give the more acute types of lesion, the vegetable proteins a more slowly advancing disease, very similar to the chronic nephritis seen in man. The albumen in the urine was shown to be rabbit serum albumen, proving that it did not arise from a simple leakage of foreign protein through the kidney cells. Newburgh also showed that long continued dosage with urea did not damage the kidneys, and concluded that the nephritis was due to certain digestion products of the proteins, and not to the large excretion of the simpler nitrogenous substances.

There has been a certain amount of criticism of the validity of these conclusions, but Squier and Newburgh in a recent paper report two series of experiments on man in which the latter's original conclusions seem to be vindicated. In "essential hypertension," i.e., high blood pressure without albuminuria or casts, the kidney shows frequently a marked degree of irritability, as evidenced by an over-response to stimuli. There is an unusually high excretion of phthalein (80-95%), the blood urea is low, and its rate of excretion high.* Such cases would be expected to give early evidence of increased irritation if subjected to increased strain. In a series of four hypertensives with urines containing at most a faint trace of albumen, no red blood cells, and who had slight to marked retinal changes, Squier and Newburgh report that the taking of a high protein diet is followed in from one to twenty-one days by the appearance of many red blood cells in the

*Lewis, D. S. Clinical Value of Ambard's Coefficient of Urea Excretion. Arch. Int. Med., 1917, Vol. 19, p. 1.

urine, by an increase in the albumen, and in three of the four the retinal changes showed an increased activity. In three cases of very early nephritis with normal pressures, red blood cells appeared after two days of the high diet. In all but one of these seven cases the hematuria disappeared promptly after the reduction of the diet, showing conclusively that the appearance of the blood was related to the heavy protein intake.

An additional point of interest was elicited in a series of four persons with absolutely normal kidneys. It was found that two meals each consisting of one and a half pounds of steak and given at a six-hour interval, produced a hematuria in every case. This blood promptly disappeared after the diet was stopped, none of these cases showed albuminuria at any time during the test period, and subjectively had no inconvenience, except a

slight feeling of having overeaten. This appearance of blood in the normal urines robs the test of any value it might have as a means of identifying very early cases of kidney damage.

While it is true, as some authorities claim, that there are dangers in a too rigid limitation of the protein intake, still such a diet is so difficult to enforce that one rarely meets with the picture of protein starvation. On the other hand, instances of protein overfeeding are being met with constantly, and these papers serve to emphasize the need of moderation in the use of protein at all time, and especially in cases of renal damage.

A further point of interest is the difference in the type of injury caused by the animal and vegetable proteins. The question of the relative "toxicity" of proteins of different origin has been only touched upon so far, and leaves a considerable field for future investigation.

Case Report

THE EFFECT OF MASSIVE DOSES OF DIURETIN

I. L. NASCHER, M.D. NEW YORK

(*Therapeutic Gazette*, June 6, 1915, p. 530-1.)

Woman, aged 65, with arteriosclerosis, chronic interstitial nephritis, aortic and mitral regurgitation, and uterine fibroid, had edema of the legs for several months, but neglected it; blood pressure 230 mm.; dyspnea; persistent dry cough. The cough, which had lasted since before New Year's, disappeared after a few doses of heroin 1/16 grain and cherry-laurel water 10 minims. From May 20th to May 28th there was a gradual diminution in the urine output, this being but 4 ounces on the 28th. The ordinary diuretics had no effect in increasing the amount of urine. On May 28th I ordered Diuretin, 7 drachms divided into 10 powders

(42 grains to the dose), one powder to be given every two hours. Before she received these large doses there was extreme edema of the left leg, some edema of the right leg, edema of the vulva, and some ascites; and there was danger of uremia setting in. The urine began to flow more fully after the fourth dose. She slept eight hours between the fifth and sixth doses. Upon awakening the treatment was continued until she had taken twenty powders, 14 drachms of diuretin, in fifty hours. The dose was then reduced to half, and after 48 hours to one-quarter of the original dose, when it was given at less frequent intervals. The diuretin was discontinued on the seventh day, the urine output being then 50 ounces. The edema of the vulva has disappeared, but not the edema of the legs or the ascites. I omit other treatment, as I want to call attention here only to the large, single, and daily doses of diuretin which can be given safely. The maximal dose is stated to be 15 grains, and for the day two drachms.

Editorial

THE PRESIDENTIAL ADDRESS

In this issue appears the Presidential address delivered before the Association at its recent Annual Meeting in Halifax. Dr. Chisholm, with his dry Scotch humor, gives good counsel to the members on many subjects, which are at present demanding the careful consideration of all, medical and lay alike. He very rightly emphasized the great importance to the medical student of careful clinical teaching not only at the bedside, but in the out-patient departments of every college hospital. At the same time we cannot help regretting

his belittling the importance of the study of physics, chemistry and biochemistry; those fundamental sciences which are gradually enabling us to understand in some degree the problems and hidden mysteries of life and growth, of disease and death. There should be no antagonism in a well directed medical school between the more or less didactic teaching of these basic subjects in the student's primary years, and the practical training at the bedside in the final years of college life.

THE ADDRESS IN SURGERY

In this month's issue we publish Dr. Hugh Cabot's address in Surgery, delivered at the recent meeting of the Association in Halifax, and the attention of all those of our readers who in any way are interested in surgery may well be called to this most practical and most timely discourse. The burden of Dr. Cabot's canticle is simple, and not long: it is this, that surgeons, in spite of the most painstaking preparation of field and hands and instruments, still suffer too often the mortification of seeing a clean operative wound become infected; that this unwelcome occurrence is too readily assumed to be due to the entrance of bacteria into the

wound through carelessness on the part of the interne, nurse, or suture-maker; that our eyes have been glued too much upon the one party, the bacteria, to the neglect of the other party, the soil, although both parties are necessary to make the quarrel of inflammation; that after doing our best to annihilate our ancient enemy, Sir Germ, we shamefully neglect, or actually mishandle our old friend and defender, Sir Soil, who thereupon falls a victim to Sir Germ Redivivus—which is the more a tragedy in that it is unnecessary.

The ill-treatment of Sir Soil, or, abandoning this somewhat superfluous figure, "the doctrine of the prepared

soil," is Dr. Cabot's theme. By this he means a soil so handled as to be "prepared" for infection, where infection would otherwise have no chance. The causes are general and local. Among the former are fear, starvation, dehydration, unsuitable anaesthetic and excessive length of operation. The latter consists in rough handling of tissues, imperfect haemostasis, mass ligatures, and in general, crude, slow work. He makes a plea, perhaps hardly needed in these days of "technique," for the "art" of surgery, not exactly the art of the ancient masters, but rather that

which consists in clean, rapid, precise, and, above all, gentle work, because the lack of such "art" is that which prepares the soil for infection.

It was obviously not Dr. Cabot's intention to write a scientific address. He chose rather to deliver a message and a warning to the plain surgeon upon a subject in which message and warning are much needed. His address will be the more useful and the members of the Association have cause to thank Dr. Cabot both for the matter and the manner thereof.

A NEW OUTLOOK FOR HOSPITALS FOR THE TREATMENT OF INFECTIOUS DISEASE

Scarcely fifty years have elapsed since hospitals for the treatment of the more important infectious diseases were established with the twofold object of securing better care and treatment of those ill with infectious disease, and of preventing the further spread of such diseases in the community; thus lessening the mortality and limiting the number attacked. That much good has been done by such special hospitals is unquestioned. Nevertheless disappointment has arisen among the public supporters of these hospitals, owing to the occurrence of cases of cross-infection among the patients, and to the fact that as yet such hospitals have failed to lower to any extent the incidence of those diseases in the community; while at the same time the isolation in separate pavilions of persons suffering from the several

forms of infectious disease has proved expensive and difficult. In his address at the annual meeting in Halifax, which appears in this issue, Dr. D. L. Richardson of Providence, R.I., presents a solution for some of the difficulties. He belittles the possibility of air-borne infection, and pleads for the recognition in every infectious hospital of the paramount importance of absolutely preventing contact infection. He states that by the elaboration of a careful technique of nursing the conveyance of infection from one patient to another may be prevented. By the use of this plan of nursing the possibility of treating many forms of infectious disease in one ward without developing cases of cross infection has been demonstrated, but it demands conscientious and carefully taught nurses to carry out the directions. We heartily commend Dr.

Richardson's address to our readers. A hospital for the treatment of all cases of infectious diseases, such as depicted by Dr. Richardson, where patients suffering from infectious disease of all kinds can be adequately cared for with-

out endangering one another by cross infections is a long step forward both in nursing and hospital management. Such a hospital should not be beyond the reach of any community in Canada.

CAUTION REGARDING PLURI GLANDULAR THERAPEUTICS

In the Presidential address before the Association for the study of Internal Secretions, Prof. Harvey Cushing (Journal Am. Med. Assoc., June 18, 1921) gives a timely warning against the sudden enthusiasm among many members of our profession regarding the present or possible therapeutic value of the active principles of the ductless glands, referring especially to the pituitary. Since the discovery in 1909 that certain easily recognized disorders are due to a state of pituitary insufficiency, hundreds of papers have appeared in medical journals to the effect "that we are now in the epoch of pragmatic endocrinology, and should make the most of the splendid opportunity." Pituitary extract is advocated by pharmaceutical houses in a multitude of conditions which have hitherto baffled us and if it does not suffice by itself we are recommended to try this or that combination of hormones containing the active principles of several glands. Never before has there arisen such an opportunity for poly - pharmaceutical charlatanism. Past experience with the thyroid should be a sufficient lesson that progress must be slow and that complex clinical phenomena must be laboriously disentangled; symptoms due to defec-

tive or excessive action of the gland from symptoms due to pressure on neighboring tissues, or to the perverted action of other glands. We must expect even slower progress with the pituitary than with the thyroid, for we are dealing with a more complicated structure. Of its great importance to the economy particularly in its influence upon growth and reproduction, and upon the evolutionary processes affecting many of man's racial characteristics there can be little doubt according to Sir Arthur Keith; but these speculative theories are not sufficiently defined to be employed in therapeutics.

We are still in the crude path-breaking stage of surgery, and progress is necessarily slow. We have first to learn to recognize and classify the types of pituitary disease which are unmistakable owing to the presence of tumours. We may easily be misled by experiences drawn from imperfect experiments. In furthering our knowledge of these ductless glands, not only the clinician, but the experimental zoologist, the comparative anatomist, the biochemist, the histologist, the physiologist and the pathologist have all much work to do. The physician or surgeon meanwhile, if incapable of participating in these underlying studies, must do the best he

can with the recognition and classification of clinical types, and should he venture to try glandular therapy must be slow to draw conclusions, particularly when the extract of more than one gland is given at a time. We have little evidence that any of these extracts, with the exception of the thyroid, have any action when given by the mouth. The profession should earnestly dis- countenance the exploration of the few

discoveries which have been made by those "who would recklessly under full sail plow through a fog bank in therapeutics, tooting their horns." We have made little advance in the treatment of pituitary insufficiencies comparable to what Sir William Ord and Dr. Murray accomplished for myxoedema, and we are still more in the dark as regards the results of disturbances in other glands, and how such results are best combated.

THE EMPLOYMENT OF THE ROENTGEN RAY FOR DESTRUCTION OF HYPERSTROPHIED TONSILLAR TISSUE

In an interesting report from the laboratories of the Rockefeller Institute for medical research (*Jour. Am. Med. Assoc.*) the results of the application of the roentgen ray to hypertrophied and diseased tonsils is given to the profession. Forty-six patients were treated, ranging in age from 3½ to 45 years of age; all showing more or less hypertrophy and disease of the tonsils and surrounding tissues. The susceptibility of lymphoid tissue to the roentgen ray had been previously shown experimentally to be so much greater than the susceptibility of other tissues that by its judicious use it was hoped that these lymphoid organs might be so diminished in size that proper drainage of the crypts would follow. The patient to be treated was placed on a table in such a position that the ray entered under the angle of the jaw, and penetrated through the soft tissues to the tonsil itself. The area exposed on each side was about three square inches, the

surrounding parts being covered by heavy sheet lead. The length of the exposure varied from three to seven minutes; as a rule one exposure was sufficient. No patients were treated so long as the throat showed evidence of acute infection. In all but four cases the treatment was followed by marked improvement. Distinct shrinkage of the tonsil was noted two weeks after the exposure and the process continued for about two months during which exudates disappeared, and the surface of the tonsil became smooth, pale, and of a healthy appearance. The results reported suggest the possibility of utilizing the roentgen rays for clearing the throat of an excess of this tissue. To judge by experiments on animals it should be possible to induce any degree of atrophy by repeating the roentgen ray treatments at suitable intervals. It is possible, however, that the hypertrophied condition may return after a lapse of time.

The Association

THE ANNUAL MEETING IN HALIFAX

We had hoped to be able to publish a report of the Halifax meeting in an earlier number, but for various reasons, in particular the printers' strike and lack of space, we have been unable to do so. The report will not take the usual form, as we will be compelled to omit all but a passing reference to the excellence of the programme and the splendid hospitality of our Halifax members. It is our intention to refer in the report more particularly to the business side of the meeting, and to make a plea for better support, particularly financial support, than we have had in the past. It is true that no special call has yet been sent out to the profession of Canada for stronger support of the Association. Perhaps it is true also that the profession of Canada has not realized the fact that their Association has been growing, that its needs have been increasing, and that necessarily more money has been required to carry on its work. It is to be hoped that our members will read this report carefully and that they will realize the necessity of rallying to the support of the Association, so that we may have in Canada a national Association which shall attain the objects so well set forth in the report of the Reorganization Committee, which follows.

The business transacted at Halifax was of exceptional importance, though perhaps it was hurriedly done owing to the arrangements of the programme. The financial report submitted by the Secretary-Treasurer showed that the Association requires the sum of \$13,200.00 to wipe out its present debt. This amount is made up as follows:

To the Montreal Medical Journal Company	\$5,000.00
To the Murray Printing Co. (balance Morang transfer)	3,650.00
To the Macmillan Co. (balancee Can. Med. monthly)	700.00
Overdraft at the bank (June 30th)....	3,850.00
 Total	 \$12,200.00

Perhaps these items need some explanation: In 1911 the Montreal Medical Journal was purchased by the Association and became its offi-

cial organ under its present name. The price of the Journal was \$5,000.00, but as there were no funds in the Association treasury to pay cash, this amount has never been paid, while the Association has been paying 6 per cent. to the stockholders. The second item, \$3,650.00, is the balance of the sum of \$7,500.00, which it was agreed to pay Murray Printing Co. when it was decided to purchase the publishing rights of the Journal from the Morang Publishing Co. It will be remembered by those who attended the Quebec meeting that the Executive Council was instructed by the meeting to acquire the publishing rights of the Journal. One of the main reasons for this step was that under the contract the Morang Publishing Co. had full control of advertisements, and many of the advertisements printed in the Journal were unethical. Apart from this there were many other reasons why it was desirable that the Association should own and publish its own Journal. After negotiations lasting over several months it was decided to purchase the publishing rights from the Morang Company for the sum mentioned.

The next item, namely, \$700.00, owing the Macmillan Co., is the balance of the sum of \$1,200.00 which it was agreed should be paid the Macmillan Publishing Co. for the Canadian Medical Monthly. Those who attended the Vancouver meeting will remember that it was proposed there by certain members to buy out the Macmillan Company's Journal for the sum of \$7,500.00. This was regarded as an extravagant sum by the committee, and no action was taken except that the Council was authorized to acquire the Medical Monthly if it could be obtained at a reasonable price. Some months later your committee was able to purchase this journal for the sum of \$1,200. This is being paid off at the rate of \$100.00 a month, and there still remains the sum of \$700.00 to be paid.

It has for some time been apparent that the present revenue of the Association could not meet its ordinary operating expenses, and, in order to carry on, certain members of the profession in Montreal, including the members of the Executive Council, became responsible to the bank for an overdraft of \$5,000.00. In this

way we have been able to meet our ordinary financial obligations. This explanation will make our members familiar with our present financial position.

The report of the Secretary-Treasurer contained the following recommendation: "That steps be taken by the Association immediately to raise a fund for the purpose of discharging its present indebtedness." And at the same time he suggested that a canvass of the members be made to secure the sum required. Acting on this report, the Executive Council decided to recommend to the general meeting that a foundation fund be raised from amongst the members of the Association. The following resolution was brought forward, and duly passed at a regular business meeting:

"WHEREAS—The report of the Executive Committee of the Canadian Medical Association shows outstanding liabilities of approximately \$10,000.00, and

"WHEREAS—It is the unanimous opinion of the Council that it would be in the best interests of the Association that these liabilities be retired in order that your Association may not be hampered in the carrying out of its many activities, and

"WHEREAS—These liabilities can be retired and additional funds made available for the projection of the work of the Association, if the members will co-operate.

"THEREFORE BE IT RESOLVED—That a bond issue be floated among our members for the sum of \$20,000.00. Each bond to be in the denomination of \$100.00, bearing interest at 5 per cent. per annum for a term of 10 years, dating from October 1st, 1921. These bonds may be redeemed at par by lot by the Association at any annual interest date whenever sufficient surplus funds are available for the purpose.

"FURTHER BE IT RESOLVED—That a committee of one member from each province—with power to add—be appointed at this meeting to secure subscription to the bonds in the respective provinces."

In putting forward this resolution the Executive Council made an appeal to the members to subscribe at once to the proposed bond issue, and lists were circulated at the meeting. As a result of this appeal some 50 members agreed to subscribe to the bond issue. This was very gratifying to the members of the Council, and it was felt that there should not be the slightest difficulty in acquiring the entire amount of \$20,000.00. The work of canvassing the members was left in the hands of a committee consisting of one member in each province. This committee is made up as follows Alberta, Dr.

Allin; British Columbia, Dr. M. T. McEachern; Ontario, Dr. Routley; Quebec, Dr. Reilly; Manitoba, Dr. Maclean; New Brunswick, Dr. Veniot; Saskatchewan, Dr. McLeod; Nova Scotia, Dr. Mackenzie. The active canvass in each province will be undertaken by these gentlemen, and it is hoped that our members will respond liberally.

Although the placing of the Association on a sound financial basis is of great importance, a still more important matter is the entire reorganizing of the Association. At the Vancouver meeting it will be remembered that a committee was appointed to bring in a report on the subject of reorganization. The report submitted by this committee at the Halifax meeting was most complete, and the Chairman, Dr. Geo. Bingham; the Secretary, Dr. J. S. McEachern, and the other members are deserving of the highest praise. We publish the report below as it was adopted at the Halifax meeting.

Other features of the meeting will not be commented on at this time. Many important resolutions were adopted, but these will be reserved for a later number. A short report on the Museum exhibit is appended.

REPORT OF REORGANIZATION COMMITTEE

The following is submitted as a sketch of the proposed plan of reorganization of the C.M.A.

It presupposes a reasonable degree of business-like organization to exist in each province. The fundamental principle underlying it is, that there must be the closest co-operation between the various Provincial Associations and the C.M.A.

Under the proposed plan there are certain obligations which each association—Provincial and C.M.A.—must undertake to fulfill. The obligations in detail would be:

1. Obligation of Provincial Association:

Each Provincial Association (a) Will make the Journal of the Canadian Medical Association its official organ and give it undivided support. It will appoint a provincial sub-editorial committee to which will be entrusted the task of collecting scientific papers and case reports presented by members of the profession resident in the province. The committee will then select those articles which it deems worthy of publication in the Journal and forward copies of them to the Editor of the Journal. The final decision as to the suitability for publication of any submitted will rest with the Central Editorial Board or with the Editor-in-Chief.

(b) As soon as the organization in the province

is available will collect from each of its members a composite fee sufficient to cover membership in the Provincial Association and the Canadian Medical Association. The sum of \$10.00 per member will be forwarded to the Canadian Medical Association to cover the cost of membership in that organization. In the meantime and until the provinces are ready to collect the composite fee the annual fee for the Canadian Medical Association shall be increased to \$10.00, beginning January, 1922.

- (c) Will undertake to keep the Business Executive of the Canadian Medical Association informed as to all new legislation affecting the profession in that province and the steps being taken by the Provincial Association to urge it, or combat it, as the case may be.
- (d) Will provide the Executive Committee of the Canadian Medical Association from time to time any information which it may deem to be of use to the whole membership of the Canadian Medical Association.

The obligations of the Canadian Medical Association are outlined as follows:

The Executive Committee shall be constituted as at present with the addition of two representatives elected by the Provincial Association of each province. The President and Secretary of the Canadian Medical Association shall be ex-officio members of the Executive Committee.

It is advisable to endeavor to have all provincial organizations elect their officers to hold office for the calendar year so as to overcome the possibility of changing the representatives during the course of the year.

Powers and functions of Executive Committee of Canadian Medical Association:

- (1) The Executive Committee shall be responsible for all business throughout the year.
- (2) They shall have power to appoint a paid full-time associate Secretary and any other clerical assistants which may be required, for the proper conduct of their work.
- (3) They shall arrange to conduct a systematic and continuous campaign through the lay press to educate the public, with regard to questions of health, sanitation, recognition of early signs of diseased conditions, the progress of Medical Science, the lack of scientific training of members of various cults which pretend to heal by irregular means, and any other subject which from time to time they may deem in the interest of the public, and the Medical Profession should be given publicity. For this purpose they shall have authority

to select a staff of contributors, both lay and medical, to prepare articles along the lines indicated. They shall appoint a board of censors (Medical) who shall review all such articles before they are submitted to the press, so as to eliminate any statements which may not be orthodox or be recognized as sound, in the light of present day medical knowledge.

- (4) They shall provide for the maintenance of a Bureau of Information at the Head Office of the Canadian Medical Association. This Bureau with the co-operation of the various Provincial Executives, will undertake to keep available full information regarding all legislation in each Province of Canada, which affects the profession, also information regarding the measures which were adopted by the profession in any Province to secure legislation favorable to, and to combat legislation adverse to, the interest of the profession in that particular Province. This Bureau will also undertake to provide, on the request of individual members of the profession information supplied to it by the various Provincial Executives relating to suitable locations for medical men in the various Provinces of Canada.
- (5) The Executive Committee will from time to time be responsible for the carrying out of investigations or enterprises which it may be directed to undertake by a general meeting of the Canadian Medical Association.
- (6) The Executive Committee will meet at any time during the year if important questions demand that a meeting be held. The travelling expenses of the members may be defrayed from the funds of the Canadian Medical Association.
- (7) The Executive Committee will be responsible for the making of such arrangements as will ensure the Journal of the Canadian Medical Association being brought up to the highest possible state of efficiency, in the interest of the whole profession of Canada.

THE MUSEUM OF THE ASSOCIATION MEETING AT HALIFAX

One of the interesting features of the Convention was its splendid museum of scientific exhibits, set up in the Physics Laboratory of Dalhousie University in direct contiguity to the section of medicine and surgery. The local committee, represented by Prof. A. G. Nicholls, had spared no pains to bring together a representative collection, which had been ar-

ranged in an attractive manner under the direction of Drs. Maude E. Abbott, W. W. Beatie and H. N. Segall, of the McGill Pathological Museum, and Mr. Walker of Alberta University.

The University Exhibits consisted of some one hundred and fifty pathological specimens, of which about seventy were contributed by Toronto, Queen's and Dalhousie, and the balance by the Pathological Museum of McGill. It was arranged in two sections (a) miscellaneous specimens, which included a very fine obstetrical and gynaecological series; brain tumours, kidney and liver conditions, and (b) specimens for the illustration of papers on the programme. Under the latter heading were grouped a number of specimens which presented a consecutive study of the lesions referred to in the papers, and as such elicited much interest; among these the collection contributed by Dr. L. M. Murray of Toronto on "Sub-acute Bacterial Endocarditis" was noteworthy; also the several series of specimens illustrating Cardiac Embolism and Thrombosis in Mitral Stenosis; Gastric Ulcer; Surgical Conditions of the Stomach and Duodenum and the Septic Uterus.

The Canadian Army Medical Museum contributed a large exhibit sent by special permission of the Director-General of Medical Services, from the National collection now in course of preparation at the Medical Museum of McGill University. It comprises a number of color preparations of gunshot wounds, gas gangrene, gassed lungs with sequelae; other injuries of moist tissue, a unique series of war traumata of bone collected and prepared in the field by Major L. J. Rhea; also reproductions of water-color drawings of Canadian Army Medical arrangements at the front, and with models for field sanitation by Major R. St. J. MacDonald. There were also on exhibition photographs, water-colors and charts illustrating recent advances in facial surgery; also traumatic lesions of the eye, and injuries of the thorax, the latter from a collection made by Col. Norman B. Gwyn of Toronto. This war exhibit was greatly appreciated by the members of the Association and was made the subject of a special resolution to the Canadian Government.

Two pathological sessions were held in the museum under the chairmanship of Prof. A. G. Nichols at which all specimens of interest in the University exhibit and the Canadian Army Medical Museum were demonstrated by the ex-

hibitors and discussed by the contributors to the programme.

CANADIAN MEDICAL ASSOCIATION

Statement of Receipts and Disbursements for Year

Ending 31st December, 1920

RECEIPTS

Balance in bank, Jan. 1st, 1920....	\$ 317.75
Annual Fees—	
Paid direct	\$ 5,392.09
Paid by draft	3,968.70
	—————
Advertisements	9,360.79
Reprints	4,951.48
Sundries	841.17
Overdraft in bank, Dec. 31st, 1920.	176.93
	17.02
	—————
	\$15,665.14

DISBURSEMENTS

Refunds paid Provincial Societies—

Alberta	\$ 100.00
British Columbia	35.00
Manitoba	50.50
New Brunswick	30.00
Nova Scotia	27.00
Saskatchewan	23.50
	—————
	\$ 266.00

Journal Account—

Printing	6,918.95
Illustrations	387.10
Murray Printing Co. on a/c Morang	1,200.00
Agents' Commission	1,080.46
	—————
Reprints	9,586.51
	592.34

Montreal Medical Journal Co.— Payments to stockholders \$5,000.00 at 6%	300.00
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General Expenses—

Auditors' Fees	\$ 35.00
Bonus (See 'y-Treas.) two years.	300.00
Postage	230.00
Salaries	2,480.50
Stationery and Printing	310.16
Sundries, Telephone, etc.	242.97
Travelling Expenses	144.96
Advances to Associated Secretary	100.00
	—————
	3,843.59

Vancouver Meeting—

Travelling expense	\$ 585.60
Share of general expenses	491.10
	—————
	1,076.70

\$15,665.14

VERIFIED, subject to our report of this date.

McDONALD, CURRIE & CO.,

Montreal, 9th June, 1921. Chartered Accountants.

Abstracts from Current Literature

CORRECTION

We regret to announce that in the first paragraph on Page 588 in our August number, an error has occurred. The sentence appearing "Subsequent to this, 'treatments are repeated at intervals of one month, etc.'" should read "Subsequent to this, 'blood examinations are repeated at intervals of one month, etc., etc.'"

Apologies are offered to the author for this mistake.

MEDICINE

The Absence of Pancreatic Secretions in Sprue, and the Employment of Pancreatic Extract in the Treatment of this Disease.
Brown, Thomas R.: Amer. Jour. Med. Sci., Apr., 1921, Vol. 161, p. 501.

The writer calls attention to the absence of the pancreatic secretion in sprue.

Sprue has been defined by Castillani and Chalmers as "A chronic catarrhal inflammation of the alimentary canal of unknown cause characterized by a peculiar ulcerative condition of the tongue and mouth, and by the passage of large, pale, smooth motions, the symptoms waxing and waning periodically."

In the stool and in the duodenal contents Brown found all the pancreatic ferments absent, and on this basis treated five cases by the administration of 5 to 10 grains of pancreatin and 20 to 40 grains of calceum carbonate three times daily. In four of the cases remarkable improvement occurred, and in one case no improvement was noted.

In addition to the pancreatin the usual dietetic measures were carried out.

The pancreatic deficiency is not regarded as necessarily the cause of the disease, but as a probable cause of some of its symptoms.

A. H. GORDON.

The Use of Diet in the Treatment of Arthritis.
Pemberton, Ralph: Amer. Jour. Med. Sci., Vol. 141, p. 517.

This writer summarizes certain views with

reference to the dietetic treatment of arthritis. Following the view that arthritis may be the reaction to diminished oxidation in the body resulting from the stress of a focal infection, the lightening of the metabolic load by a fairly sharp reduction in the caloric intake has been found of definite value in the amelioration of the arthritic symptoms.

Pemberton emphasizes the care required in gauging the food reduction and the necessity of accurate observation of its effects, but gives a most encouraging outlook upon the value of this therapeutic method.

A. H. GORDON.

SURGERY

Chemical Influence of the Active Constituents of the Ductless Glands. Kendall, E. C.: Surg. Gyn. and Obst., March, 1921, Vol. 32, p. 205.

Up to the present the active constituents of only two glands have been isolated. Epinephrin was isolated from the adrenal medulla in 1901. It possesses a definite chemical composition and has been made synthetically. When administered it has an immediate effect on blood pressure and a rise in the metabolic rate. The duration of its action is very short. Recently thyroxin has been identified as the active agent of the thyroid gland. The injection of this substance will bring about all the changes in the thyroid-deficient individual that are brought about by dessicated thyroid. It contains about 65 per cent. of iodine. The physiological dose is from 1/50 to 1/75 milligram per kilo of body weight. Yet one thousand times as much as this was administered intravenously to a small dog with only a slight passing effect. It was found that the tissues would absorb only a certain amount, the balance being excreted before it had time to function. Typical symptoms of hyperthyroidism are produced by the persistent administration of thyroxin.

GEO. A. FLEET.

The Treatment of Congenital Hypertrophic Stenosis of the Pylorus by Rammstedt's Operation. Ramsay, R. A.: Brit. J. of Surg., April, 1921, Vol. 8, p. 397.

Although the etiology of congenital hypertrophic stenosis of the pyloris is still obscure, several probable theories have been advanced. The writer recognizes the possibility of successful non-operative treatment. This consisted in regular stomach lavages, associated with feeding of small quantities at frequent intervals. Recently two new methods have been described. One consists in giving thick foods. The other advises the use of large doses of atropine in the food to inhibit the action of the sphincter.

Medical treatment is the ideal method, when this is possible, as the patients are very poor operative risks.

If a child does not show some immediate response to the treatment, judged by a relief of the vomiting and a gain in weight, it should at once be discontinued and surgical measures adopted. The author reviews several operations for the relief of the symptoms, but considers Rammstedt's method the most satisfactory. This consists in dividing the hypertrophied muscular coat in the axis of the pyloric canal, leaving the mucous membrane intact and using no sutures to close the gap.

Deep ether anaesthesia is advised to prevent shock. Before starting the anaesthetic, the stomach should be washed out with a solution of bicarbonate of soda.

Certain important complications in the post-operative period may occur, such as, shock, haemorrhage, peritonitis, diarrhoea and post-operative fever, any of which may prove fatal.

GEO. A. FLEET.

The Protection of the Patient in Surgery of the Thyroid. Crile, Geo. W.: Surg. Gyn. and Obst., March, 1921, Vol. 32, p. 213.

The patient must be protected against the psychic stimuli of fear and worry before, during and after the operation. All operative arrangements must be kept from the sight of the patient. In extreme cases inhalation anaesthetics, especially ether, are contra indicated owing to their production of suboxidation. Gas and oxygen analgesia, combined with local anaesthesia, is entirely free from this serious objection. Myocarditis may also produce the same condition. 30 minimis of the tincture of digitalis every four hours for 15 doses may relieve the symptoms. Water in large quantities is absolutely essential, either by mouth or

subcutaneously. Some investigators suggest giving 2 grains of thyroid extract the evening before and 2 grains on the morning of the operation to counteract a too sudden withdrawal of thyroid activity. In extreme cases the wound may be left open to prevent the absorption of wound secretions. Ice is used freely to overcome the so-called post operative hyperthyroidism. When the temperature rises to 103 ice packs are resorted to.

GEO. A. FLEET.

The Differentiation of Saphenous Varix from Femoral Hernia. Stetten DeWitt: Surg. Gyn. and Obst., March, 1921, Vol. 32, p. 235.

Owing to the frequency with which dilatations of the upper end of the saphenous vein are confused with femoral hernia, the author points out the main points in the differential diagnosis.

In varix the swelling is usually somewhat lower down; other varicose veins will usually be seen; reduction of the tumour and pressure over the femoral ring by the examining finger does not present a reappearance of the tumour when the patient stands up; when the patient coughs one does not get a frank impulse, but a fluid wave or thrill; where there is a small amount of subcutaneous tissue, a bluish sheen to the skin over the swelling is usually seen.

GEO. A. FLEET.

Carcinoma of the Large Intestine. Stutton, J. Lionel: Brit. M. J., April 16, 1921, p. 555.

Too much time should not be lost trying to arrive at a certain diagnosis of carcinoma of the large intestine because such progress is made by the disease that one soon finds that little can be done by operation. A history of abdominal pain associated with irregularity of the bowels persisting for twelve months is considered sufficient cause for an exploratory operation.

Operations on the large bowel for carcinoma, if performed within one year of commencement of the new growth, permit of a favorable prognosis.

Methods of treatment: Operate early and freely, and remove at least four inches of bowel on each side of the growth together with the mesentery and lymphatic glands. Short circuit when possible, for growths which cannot be removed by operation.

A. ROSS.

The Indications for Cholecystectomy. Monsarrat, K. W.: Brit. M. J., March 12, 1921, p. 37.

The author considers his subject from physiological, pathological, and clinical standpoints.

Physiologically he concludes that the gall bladder is of no particular functional value in the human organism.

Pathologically he points out that the gall bladder is a diverticulum with a very narrow neck and that its contents tend to stagnate. This is most important inasmuch as bile and mucus, the normal content of the gall bladder, is a favorable medium for bacterial growth. Bacteria reach the gall bladder through the portal circulation and set up a cholecystitis.

Inflammation of the gall bladder so changes the constituents of the bile that cholesterol is thrown out of solution and forms the nidus for biliary calculi. For anatomical and pathological reasons he believes that a gall bladder which has once been the seat of an inflammatory process, will always remain a menace to good health, unless removed at operation.

Clinically this is borne out by the great number of patients who suffer persistent ill-health following cholecystostomy, due to chronic cholangitis, chronic pancreatitis, recurrent attacks of pain and tenderness in the region of the wound, and gastric disturbances due to adhesions.

Cholecystostomy should be performed only when the patient's age or feebleness demands the shorter and easier operation.

Drainage is necessary only when there is an associated pancreatitis, and then a rubber tube draining the common duct is all that is required.

A. ROSS.

Scoliosis. Kleinberg, S.: Surg. Gyn. and Obst., April, 1921.

This is a plea for the early treatment of organic scoliosis by plaster jackets, rather than by exercises. It should be instituted as soon as the curvature is discovered, and should be carried on uninterruptedly for years until improvement has been obtained and until such time as will reasonably assure arrest of the deformity.

Application of the jacket with the patient partly suspended is described and illustrated. Over correction, or as much correction as possible, is obtained by side pulls, the body not being flexed as in the Abbott method. Jacket should be renewed constantly every 1-2 months.

A large pad is inserted in the hollow side of the trunk, to be removed after the plaster has hardened. During change of jackets there must be no opportunity for relapse of the deformity.

J. A. NUTTER.

The Orthopaedic Treatment of Poliomyelitis. Fairbank, H. A. T.: Brit. M. J., April 9, 1921, p. 517.

The stages of the disease are described, rest and the prevention of deformity being insisted upon. All reconstructive surgery is to be delayed until the third stage begins two years after the onset, by which time spontaneous recovery is usually not to be expected. The importance of guarding a weakened muscle against overstretching is emphasized, and credit is given to Sir Robert Jones for this important factor in the treatment of poliomyelitis. Massage is regarded with favor, electricity with doubt as to its usefulness. Splints to combat various deformities are described. Tendon transplantation and arthrodesis are discussed, the latter never to be done before the age of nine years.

The Whitman operation of astragalectomy is spoken of with favor, silk ligament with disfavor.

In regard to the operative treatment of paralytic scoliosis it is stated that more work is being done in the United States and in Canada than in England.

J. A. NUTTER.

Congenital Torticollis. Meyerding, H. W.: Am. J. of Orthop. Surg., March, 1921.

Twenty-six cases are reported. The character deformity is described, the head of the affected side, the chin towards the opposite shoulder, with scoliosis and facial asymmetry. Etiology is trauma to sternomastoid at or preceding birth, producing ischaemia, and chronic interstitial myositis, the affected portion of the muscle becoming hard and cord-like. The differential diagnosis of Pott's disease, infection with myositis and perispondylitis, spasmodic torticollis, fracture and syphilis are discussed. Congenital deformity of the spine should always be borne in mind in order that an accurate prognosis may be made.

The treatment is to divide all contracted structures and put the head up in an over corrected position for 1 to 3 months in plaster of Paris. The fixation needs correction until

the scar shows no tendency to contract. Results are good, though in adults and older children facial asymmetry will persist.

J. A. NUTTER.

Surgery of the Spleen. Moynihan, Sir Berkeley: *Lancet*, Jan. 22, 1921, p. 157.

This article, which is a partial report of the Bradshaw lecture, is the most complete review of the surgery of the spleen which has come out in recent literature. It covers six full pages in the *Lancet*, and the subject of pathology of the spleen, the association of it with that of the liver, and the treatment of various anaemias, are fully discussed. The pathology of disease of the spleen is necessarily bound up with the physiology and pathology of the liver. The pathology of the spleen cannot be separated from (a) the way the liver handles the end products of splenic disease, and (b) pathological results produced in the liver cells thereby.

It is known that toxins or infective organisms may act (1) on the floating blood cells, or (2) carried with the blood stream may selectively attack certain tissues. This has been well shown by Rosenow. Such toxins in the blood stream may in the spleen cause (a) degeneration, (b) excite the spleen cells to over-activity. As a result we have both the toxin and the products of splenic degeneration and the products of over-activity all to be considered where the spleen is so influenced. It is known that the blood from the spleen first meets with the blood from the stomach and from the tail of the pancreas and in the liver is first brought into contact with the Kupffer star cells and the endothelial cells of the hepatic sinusoid or the liver cell itself. Then we get degeneration and re-active (cirrhotic) changes. Toxins may go through the liver cell without altering it to the biliary channels, and, acting on the bile, cause lessened bile fluidity with precipitaton and obstructive jaundice. In the spleen toxins may cause anaemia by producing haemolysis as well as by producing secondary fibrosis of the organ, cirrhosis of the liver, or may actuate certain cells and produce one of the leukæmias, myeloid type. In the study of the production of anaemia we have to deal with the active poisons which produce anaemia (1) by interfering with red cell formation, (2) haemolytic poisons which destroy red cells or render them sensitized, more friable, and more easily destroyed, (3) toxins which produce fibrosis, and (4) poisons which excite cell proliferation, thus affecting the Malpighian body and causing lymphatic leukæmia and Hodgkin's

disease. Toxins affecting the spleen may cause anaemia by interference with the production or destruction of the red cells or interference with the proper ingestion by the liver of the iron carrying broken-down cells from the spleen. These iron-laden endothelial cells from the spleen are too large to pass through the minute capillaries in the liver. They alone supply iron in its needed form and apparently only from the spleen are such cells brought to the liver. In splenic anaemia the liver cells themselves are not injured. In haemolytic splenomegaly the hepatic cells are injured and we commonly get toxins passing through into the bile channels with cholecystitis, cholelithiasis, etc. Other signs of splenic disease besides anaemia are jaundice, produced as explained above, petechial haemorrhages due to "endotheliotoxin," muscular weakness with wasting, pyrexia, splenomegaly, leucocytosis, and haemorrhagic conditions. The spleen is of largest size in Gaucher's disease, next in leukæmia, then in malaria, and sometimes enlarges in pernicious anaemia. In pernicious anaemia we find a low white cell count because of the poisons acting on the bone marrow. On the other hand, in haemolytic jaundice there is usually an increase of leucocytes as we get bone marrow stimulation. The results of splenectomy in pernicious anaemia show that there is a definite increase in the length of time that patients survive after splenectomy over those not so treated. In the cases quoted in the Mayo Clinic, up to September 20th, 1920, twenty-two per cent. lived two and one-half times as long as the average. There were 53 cases with three deaths. Five were living four to five years after splenectomy, and eleven were living three to four years later. Percy found in operative cases that there were infective foci present in 95 per cent. of these cases. Bacteria were grown from three of the nine spleens removed, four of the seven gallbladders, and six of the seven appendices. In 20 of 24 cases there were cholecystitis. Haemolytic streptococci were found in seven cases, *B.-coli* in five cases, and the streptococci viridans in four cases. Moynihan states that in leukæmia radium produces astonishing effects upon the spleen. X-rays over the spleen also cause a very marked diminution in size. Benzol is a very valuable product associated with either x-rays or radium. Splenectomy is advised only in selected cases.

Splenic anaemia shows three distinct stages, (a) enlargement of spleen with secondary anaemia, three to twelve years, (b) gradual liver enlargement and decrease of urine secreted—for a brief period, (c) shrinkage of liver and ascites, one to two years. In this disease, splenectomy, if done early, cures. In the Mayo

Clinic there were 73 operations with nine deaths. It is to be noted that in splenic anaemia the red cells do not show fragility, there is leucopænia and there is always splenic enlargement.

Hæmolytic jaundice may be acquired or congenital. In the acquired form there is acholeluric jaundice, enlargement of the spleen and anaemia, often of a very rapid production. Red cells may fall to 1,000,000 in a few weeks. There is an increase in the number of reticulated cells and there is an increased fragility.

Summary—Splenectomy is advised in Banti's disease, that is splenic anaemia, hæmolytic jaundice, occasionally in cases of pernicious anaemia which have been built up by "step-ladder" transfusions of whole blood, possibly in some cases of leukæmia. The removal of the spleen for injuries is apparently without any definite permanent effect on the organism, and its removal in these stated diseases is apparently the removal of the chief, if not the only, cause of the disease.

The paper is well worth study by not only surgeons, whose attention is arrested by its title, but by internists, hæmatologists and pathologists.

C. K. P. HENRY.

RADIOLOGY

Cardiospasm. Butler: Am. J. Roentgenol., Oct., 1920, p. 478.

The paper is illustrated by a case of congenital cardiospasm in a man of 34, and reference is made to a very thorough paper on the subject, in which 63 cases are reported, by Smithies, in the Journal of Roentgenology, 1919, ii. Dr. Butler concludes that "Roentgen examination gives a typical picture; dilated oesophagus, perfectly smooth in contour, coming down to a point at its lower end, and long retained barium. In carcinoma there is little dilatation above the obstruction because of the rigid, infiltrated walls, and the outline at the constriction is ragged; in addition the carcinomatous obstruction passes only fluids, while the cardiospasm takes solids better. The spasm may be intensified by the use of irritating substances, as ground pineapple, or by very cold drinks, and may often be relieved by atropine. Stricture following trauma rarely is seen so low down, and, furthermore, has a definite history. Syphilis, of course, may imitate every condition, but is very rare in this location and also offers other positive diagnosis."

J. D. MORGAN.

Inflation of the Colon as an Aid in Roentgen Examinations. Phillips, H. B.: Surg. Gyn. and Obst., Nov., 1920.

Philips describes how the borders of a large hypernephroma (left) were clearly outlined by distending the colon with air by means of a bicycle pump attached to a rectal tube which had been inserted into the colon, the patient lying on his left side. He concludes that "This method does not offer as universal an application as oxygen inflation of the peritoneum." It is, however, expeditious, and is free from dangers and inconveniences.

J. D. MORGAN.

Injection of Bile Ducts with Barium. Beall, F. C., and Jagoda, S.: J. A. M. A., May 28th, 1921, p. 1483.

Report of a case.—A woman, aged 42, past history negative. Present trouble began with pain in epigastrium, intermittent in character, and not related to the taking of food. She had nausea and vomiting. Fever was present with chills. No jaundice. A barium meal examination showed a normal stomach. Six hours later the stomach was empty, the duodenum outlined, and above the duodenum irregular branched projections of the barium. More barium was given and another skiagram made (reproduced with the report). It shows what seems to be an injection of the bile ducts with barium.

At operation the stomach and duodenum apparently were normal, and the gall bladder and ducts were normal in appearance. The pancreas was felt as a hard, enlarged mass behind the stomach. A diagnosis of acute pancreatitis, with abscess and insufficiency of the papilla of Vater was made. The patient eventually died. Necropsy was refused.

The writers offer the suggestion that the frequent vomiting was what forced the barium into the bile ducts.

They conclude: "Might it not, then, be possible that many patients with a similar condition are roentgenographed and the condition not discovered because the vomiting is not present to force the barium into the ducts? And if an insufficiency of the papilla of Vater should prove to be of common occurrence, might we not have to reconstruct our ideas of the etiology of acute pancreatitis?"

J. D. MORGAN.

Instantaneous Radiographs of the Human Heart. Eyster and Meek: Am. J. Roentgenol., Oct., 1920.

The paper is summarized by the authors

thus: "A method is described for making rapid x-ray shadowgraphs of the human heart with a cassette-changing mechanism allowing two exposures within the same cardiac cycle. By recording a simultaneous electrocardiogram the exact incidence of these exposures in the cardiac cycle is determined, and their position may be quite accurately chosen by listening to the heart sounds and closing a key by hand. The changes in shape and size of the normal human heart during its cycle are described, so far as we feel justified, on the basis of observations made up to the present time. The more important points that we feel are evident at present are the following: (1) The movement of no single border of the heart is an accurate index of the extent of its contraction. The whole outline is necessary for such estimation. (2) The mechanism of ventricular filling would seem to be very similar to that which physiological experimentation has established as being present in the dog, especially in that the major part of ventricular filling occurs shortly after the ventricle goes into relaxation and is in large part completed before the subsequent auricular contraction, systole of this chamber playing little role in adding blood to the ventricles."

J. D. MORGAN.

Organ Stimulation by the Roentgen Ray. Petersen and Saelhof: J. A. M. A., March 12th, 1921, p. 718.

Heretofore the x-rays have been almost exclusively used in therapeutics for their destructive effect. It is a biological aphorism that agents which in large doses are toxic to cells act as a stimulant in small doses.

In the present instance the writers refer to the stimulation of metabolic processes rather than to reproductive stimulation.

Experiments were done with dogs. Cannulae were inserted into the common bile duct and into both ureters. In each case considerable increase was noted in the volume of secretion following x-ray stimulation as compared with the volume obtained during a similar period before stimulation. In another dog a partial resection of the pancreas was performed. It was observed that the only time that this animal was sugar free was two days after x-ray stimulation. From the clinical observations now in progress the impression has been gained that by means of such roentgen ray stimulation a method of decided usefulness is offered in the treatment of diabetes.

Fraenkel has recently called attention to the irradiation of the ovaries in certain forms of dysmenorrhoea, irradiation of the thymus and

hypophysis in osteomalacia, irradiation of the periosteum to facilitate the healing of fractures, irradiation of the epiphyses of bones and the hypophysis of children to promote growth, and the irradiation of the spleen and bone marrow in pernicious anaemia, the spleen in tuberculosis, etc. A second effect of organ stimulation has been noted, namely, the discharge from the cells of certain substances which act on remote pathological lesions.

Hektoen has endeavored to increase antibody production by irradiating various organs, while the authors have shown that it is impossible to mobilize enzymes after irradiating various organ complexes.

J. D. MORGAN.

An Aid to the Diagnosis of Tumor of the Urinary Bladder. Melen: J. A. M. A., March 19th, 1921, p. 782.

The author suggests that one should take an air cystogram first, then fill the bladder with sodium bromide solution, either 15 per cent. or 25 per cent., and take a second picture, and, lastly, take an immediate picture after emptying the bladder. By this latter manoeuvre it is sometimes possible to demonstrate filling defects of the bladder wall, which are not demonstrated by the two former methods.

J. D. MORGAN.

Personal Experience with the Application of the newer Roentgentherapy in Cancer. Sittenfield, M. J.: Am. J. Roentgenol, May, 1921, Vol. 8, p. 232.

The fact that recent advances in the technique of deep radiotherapy have been accomplished abroad makes it apparent that the older methods were found wanting. Insufficient penetration of hard rays to the deeper tissues, lack of measurement for practical purposes and the lack of knowledge of the exact dose necessary to influence a malignant tumour were a few of the shortcomings.

Some of these obstacles have been overcome by the construction of more powerful apparatus and of tubes to tolerate higher intensities as well as the development of means to determine the dose necessary to destroy new growth.

The author reports three cases with excellent results. The focal distance employed was 50 cm. and the portals of entry 15 x 18 cm., the rays being filtered through 0.5 mm. of zinc plus 1 mm. of aluminum. The duration of the treatment was two hours each day for four consecutive days, instead of one session of

eight hours as in Bumm's Clinic. The use of radium was employed with the x-ray treatments. It is the opinion of the author that intensive radiation for short periods is much more effective than smaller doses for long periods. With small doses frequently repeated the period of latency is considerably protracted, and, furthermore, cumulative effects may be experienced producing chronic changes which are not at all desirable. Stress is laid upon the advisability of administering the entire lethal dose at one sitting. When the condition of the patient or the danger of absorp-

tion toxæmia may not permit of this, all efforts should be directed to administering a full dose within one week.

It is most essential that sufficient intensive roentgen or radium rays be administered to affect completely all parts of the cancer without damaging or destroying healthy tissue. If any one part of the tumour receives a sub-lethal dose failure and recurrence is sure to follow. To effect the most favorable radiation to the deeper tissues, proper filtration, increase in the focal distance and increase in the size of the portals of entry must be made use of.

W. A. WILKINS.

CHILD WELFARE

The Carnegie United Kingdom Trust of Great Britain has voted \$200,000 to the Central Council of Infant and Child Welfare towards the establishment of a Central Child Welfare Institute in London, which will link up the various national organizations engaged in child welfare, and will co-ordinate the great body of voluntary effort, and thus become the central organization in the United Kingdom.

A new experiment for the further reduction of infant mortality is being made in Huddersfield. It adopts the principle of keeping mother and baby at home and there helping them. The scheme provides for adequate supervision of every child for the first year of life, and the provision of health services to mother and baby. A weekly visit for the first month, with bi-monthly visitations thereafter, is a feature of this community endeavor.

The State Health Department of Philadelphia suggests that women be trained in the cleaning of teeth ("Dental Hygienists") and that they afford a semi-annual attention to all the scholars in the State; in addition to carrying on a prophylactic campaign. Not alone would health be conserved, but scholarship would be improved under this plan. An "Automobile Dental Dispensary" is operat-

ing through the rural districts under the State Board of Health engaged in dental treatment and prophylaxis.

A municipal milk plant is being established at Jamestown, N.Y., under civic subsidization of \$150,000, whereby a modern pasteurizing plant will be erected and milk distributed to the community on a cost basis.

A Child Health Train, on the 10th of August commenced a tour of the Province of Quebec, consisting of two railroad coaches suitably equipped to carry the professional staff of at least seven Child Welfare Workers who will demonstrate Child Health possibilities in Quebec Province. One car will be entirely devoted to exhibits, demonstrations, etc., in both English and French, while the second coach will be the living quarters of the staff, as well as conference quarters. Activities will include examinations, demonstrations, lectures, exhibits and distribution of literature, along with motion pictures along health lines. Babies and children up to the age of 14 years will be physically examined; parents will be advised as to the condition of their children and instructed in the rudiments of child health. This work will be conducted on a gratuitous basis at the various points to be visited.

News Items

QUEBEC

Massage Association Aims at High Standard

The Canadian Association of Massage and Remedial Gymnastics, the incorporation of which in March, 1920, marked an important step towards the full recognition of the value of massage and remedial gymnastics, has already advanced appreciably towards the realization of its aims. These include the improvement of the status of those engaged in the practice of the profession under medical supervision; the maintenance of a uniformly high standard in the Dominion through the annual appointment of an examining board; the establishment of a uniform curriculum of studies and the offering of courses qualifying students for full membership; the promotion of active co-operation with the medical profession, hospitals and universities of Canada; and the establishment of registries of trained workers, available to medical practitioners and to the general public.

The membership of the association now exceeds eighty, and is representative of all parts of the Dominion. Two local branches have been formed in Toronto and Montreal, and in each of these cities registries have been established. The association has offered to Hart House graduates and others qualified for military work two post-graduate courses, giving

the necessary training for civilian practice, which admitted to full membership in the Dominion association. Similar courses will be offered in the future in various Canadian centres, those selected being the points most convenient to the largest number of students wishing to make use of the course. Every encouragement is offered by the association to its members to improve their qualifications through the special lectures and post-graduate work which it promotes from time to time.

The headquarters of the Dominion association are in Montreal. The Advisory Committee, which will shortly be appointed, will consist of prominent medical men and members of other professions from all over Canada. The present officers are as follows: Hon. President, Dr. F. W. Harvey, Montreal; President, Miss E. M. Cartwright, Montreal; Vice-President, Mr. D. J. McDougall, Toronto; Secretary-Treasurer, Miss L. J. Longworth, 74A St. Famille street, Montreal. Board of Directors. Miss E. B. Asplet, Miss E. M. Cartwright, Miss E. M. Fisher, Mrs. N. S. Hay, Montreal; Mr. D. J. McDougall, Mr. R. A. Holmes, Miss M. Potts, Mrs. Bruce Robertson, Miss E. H. Turner, Toronto. Executive Committee, Mrs. Bruce Robertson, Miss A. McLaughlin, Toronto; Miss Asplet, Miss Fisher, Mrs. Hay, Montreal.

ONTARIO

The forty-first annual meeting of the Ontario Medical Association took place at Niagara Falls on May 31st, June 1st, 2nd and 3rd, 1921. The importance of this association can be gathered from the fact that there were registered between seven and eight hundred physicians, and since in addition to an excellent scientific programme, much business of vital interest to the medical profession at large was transacted, it is considered wise to publish *seriatim* a complete report of the meeting.

Too much credit cannot be given to the very able officers of the association, the President, Dr. J. Heurner Mullin; the First Vice-President, Dr. F. J. Farley; Second Vice-President, Dr. F. A. Clarkson; the Hon. Secretary, Dr. T. C. Routley, and the Hon. Treasurer, Dr. G. Stewart Cameron.

The Committees on Programme, on Entertainment, on Arrangements, on Publicity, on the sections of Medicine, Surgery, Obstetrics and Gynaecology, Eye, Ear, Nose and Throat,

and Radiology, must be complimented on the active, business-like manner in which their various duties were performed.

Especially to be noted was the appearance of a daily bulletin, and the appearance, in addition to the programme, of two other printed booklets, one detailing the post-graduate schedule organized by the association, with the aid of the Universities of the Province; the other, a complete record of the business programme, which included the articles of incorporation of the Ontario Medical Association, the by-laws and reports of the various committees; these articles, by-laws and reports will be published in the news items of the Ontario section.

A departure from the usual method of procedure was the publication and distribution of the presidential address before its delivery, done in order that the essentials might be the better grasped.

The scientific meetings held in the auditoriums of the Clifton Hotel were well attended, began fairly promptly, and brought out considerable discussion. It is much to be regretted, however, that the association has as yet no arrangements for a complete stenographic recording of addresses and discussions. No proper description of an association's meeting can be made without an arrangement of this sort, and one realizes that much of the value of any scientific meeting depends upon these first-hand notes, particularly to-day when free-hand talks are taking the place of written papers.

The programme of the scientific side of the meeting has already appeared in a previous number. It would be of questionable value merely to detail the papers read and addresses given, without the discussion which should go therewith. The Editorial Board wishes, however, to express the hope that at the next meeting nothing shall be allowed to go unreported, so that papers and discussions may reach subscribers not present at the association's gathering.

Particular mention must be given to the address in medicine by Dr. Frank Billings of Chicago, "Modern Medicine and the General Practitioner"; to the address in surgery by Dr. E. Starr Judd of the Mayo Clinic, "Surgery of the Gall Bladder and Bile Ducts," and to the addresses by Dr. White of Pittsburg, Dr. G. C. Stewart of New York, Dr. John Amyot of Ottawa, and the President of the association, Dr. J. Heurner Mullin, which followed the two dinners. The conditions under which these addresses are given make this feature of the association's meeting something quite unequalled in any medical gathering, and are to be recommended to any committees who are interested

in seeing a satisfactory demonstration of any project.

The programme in the section of medicine comprised two symposia, "diabetes" and "pneumonia" occupying a morning and an afternoon, respectively, two morning sessions on other days, and a joint session with surgery, a symposium on "gastric and duodenal ulcer" taking one other afternoon, giving in all two and one-half days.

The section of gynaecology and obstetrics occupied in its turn one complete day and two half days, including a joint session with surgery.

The surgical section occupied one full day, two half days and, as noted, another half day in combined session with medicine.

The importance of the x-ray section can be judged from the fact that both Ontario and Canadian Radiological Societies were meeting in conjunction, and that two full days and a half were required for the staging of their programme.

Eye, ear, nose and throat required one full day and two half-days for the presentation of their papers and discussion.

Each contributor to the programme has been written to, asking for the paper, the address or the substance of his remarks. It is urged that in future everyone appearing before the association shall be required to give at least a résumé of his remarks, if they do not exist in the form of a written paper.

(To be continued)

A Visit to Algoma and Thunder Bay

In order that closer co-operation might be established between the northern and other parts of the Province, a unique plan was decided upon by the Directors of the Ontario Medical Association.

On Monday, Sept. 5th, a party of ten, including four doctors' wives, left Toronto at 7 p.m., arriving at Sault Ste. Marie at noon on the following day, when the party was cordially received by several members of the local medical profession. At 3 o'clock in the afternoon the first meeting opened at the General Hospital, with Dr. J. R. McLean, President of the Sault Ste. Marie Medical Society, in the chair, and practically the entire medical profession of the district present. The first paper was given by Dr. F. W. Marlow of Toronto, his subject being "Inflammatory Diseases of the Female Pelvis." From the practical way in which the subject was handled, and the discussion which followed, it was quite apparent

that the hour had been appreciated by all present.

The next address was presented by Dr. Geo. S. Young of Toronto on the subject of "Goitre." Dr. Young in his discourse systematically discussed goitre from every angle, particularly bringing out the very latest ideas as to aetiology, differential diagnosis and treatment. By the rapt attention accorded the speaker it was evident that the local Medical Society thoroughly appreciated Dr. Young's presentation.

The meeting adjourned at 5.30 p.m. to take a drive about the city, the party drawing up at the Country Club for dinner at 6.30 p.m. This happy function, again presided over by the President, Dr. McLean, afforded a splendid opportunity for the visiting gentlemen to become acquainted with their colleagues in Algoma.

The meeting assembled at 8 o'clock at the General Hospital for the evening programme. Dr. E. R. Secord of Brantford, the first speaker on the programme, gave a most interesting and practical paper on the subject of "Some Observations on Abdominal Surgery of Interest to the General Practitioner." Particularly outstanding in Dr. Secord's remarks were the views which he set forth in regard to the diagnosis and treatment of many of the more frequent abdominal conditions requiring surgical intervention. The paper brought out some very interesting and profitable discussion.

Dr. R. S. McComb followed with an excellent discourse on "Cystitis," his subject also appearing to be of marked interest to the gathering.

Dr. F. J. Farley of Trenton, President of the Ontario Medical Association, in a brief address marked with cordiality, sincerity and humor, left nothing to be conjectured in the minds of his hearers as to the absolute need of greater co-operation and unity on the part of the medical profession in this Province.

Dr. T. C. Routley of Toronto, Secretary of the Ontario Medical Association, presented to the meeting a resumé of the progress which had been made by the Association up to the present time, and strongly urged upon everyone present the advisability of the medical profession throughout not only the Province of Ontario, but the entire Dominion, becoming thoroughly organized for the benefit of the profession and the public.

Dr. Edgar Brandon of North Bay, Counsellor for the district in the Ontario Medical Association, in a few very pointed remarks brought forth the advantages which had accrued to other groups in society by unified and organized efforts. The day's session came to a close at midnight with a unanimous vote of

thanks being tendered to the visitors by the Sault Ste. Marie Medical Society for the splendid programme which had been presented.

The visitors departed from the "Soo" at noon on Wednesday on board the steamship "Hammonie" bound for Port Arthur. The hearty send-off accorded them by the local medical profession was a very fitting culmination to the splendid hospitality which was in evidence throughout the entire stay at Sault Ste. Marie.

Arriving at the Prince Arthur Hotel, Port Arthur, early Thursday morning, the party was met by a group of practitioners of the twin cities of Port Arthur and Fort William. Here again was evident a hearty reception on all sides.

On the evening of Thursday the visiting doctors were called upon to participate in functions a little apart from ordinary Medical Society meetings, when Drs. Marlow and Routley were invited to address the Kiwanis Club dinner, and later in the evening, Drs. Farley, Marlow and Routley extended greetings to the graduating class of nurses from St. Joseph's Hospital.

The first general meeting commenced at 9 p.m. on Thursday, the programme being taken by Drs. Secord, Young and McComb, who presented the same subjects as they discussed at the "Soo."

Friday was a busy day. Together with visits to the local hospitals, luncheon parties, clinical work, and a drive to the most picturesque Kakebequa Falls, some twenty miles distant from Fort William, a most pleasant time was enjoyed by all. At 8 p.m. a get-together banquet was served, and was followed by a programme supplied by Drs. Marlow, Farley and Routley.

On Saturday morning the party left for the east on board the steamship "Hammonie," a large representation of the local medical fraternity being present to extend heartiest felicitations to their guests and their colleagues in the East.

The visitors arrived home on Monday, September 12th, each one enthusiastic with praise for the delightful and profitable time which had been spent. It is particularly worthy of note that during the meetings held the attendance at both points for a radius of more than one hundred miles was in the neighborhood of 99 per cent. of the local practitioners.

Ontario News Items

To Counsellor District No. 9 of the Ontario Medical Association, presided over by Dr.

Edgar Brandon of North Bay, belongs the credit of having staged for the second time the most unique district meeting yet held by the Association. According to arrangements, every detail of which was thoroughly worked out by the committee in charge, a party of one hundred, including a fair share of ladies, boarded the steamer "Armour" at Burk's Falls at nine o'clock on the morning of August 3rd setting sail down the beautiful Magnetawan River.

The morning was spent in a social manner. At 11.30 the party disembarked at Magnetawan village, being entertained to luncheon by Dr. and Mrs. J. S. Freeborn. Most sumptuous indeed was the repast, and, despite the hearty appetites which the morning hours had developed, the party found it difficult to do full justice to the elaborate courses which were laid before them.

The steamer was again boarded at 1 p.m., proceeding down the Ahmic Lake, the afternoon hours being occupied by the following excellent programme:

1. Fractures as Related to the General Practitioner. Dr. W. E. Gallie, Hospital for Sick Children, Toronto, Ont.
2. What Will Radium Do? Dr. H. A. Kelly, Johns Hopkins University, Baltimore, Md.
3. Diagnosis and Results of Surgical Treatment of Tuberculous Colitis. Dr. C. D. Parfitt, Calydor Sanatorium, Gravenhurst, Ont.
4. Infant Feeding. Dr. Charles Summers, Prof. of Pediatrics, University of Maryland.
5. Child Welfare Work in the Country. Dr. W. J. Bell, Provincial Board of Health, Ontario.
6. Abdominal Surgery. Dr. Thomas S. Cullen, Johns Hopkins University, Baltimore, Md.
7. Vital Need of Sanitation in Country Districts and Smaller Towns. Dr. Lillian South, Chief Bacteriologist, State of Kentucky.
8. The Development of a Modern Medical School. Chancellor James Kirkland, Vanderbilt University, Nashville, Tenn.
9. Medical Education. Mr. Abraham Flexner, LL.D., Secretary of the General Educational Bd. of U. S. A.
10. Eclampsia. Dr. G. W. Smith, North Bay, Ontario.

At 5.30 p.m. the party again disembarked at "Wildwood," Lake Cecebe, the summer home of Dr. and Mrs. H. L. Barber, where the ladies of Burk's Falls and Cecebe Lake entertained at supper in a manner quite rivalling the bountiful hospitality shown by Dr. and Mrs. Freeborn. Following supper, several members of the party enjoyed a game of golf on the splendid course which Dr. Barber has established at his summer home. During the evening sail back to Burk's Falls short addresses were de-

livered by the following officers of the Ontario Medical Association:

- Dr. F. J. Farley, President.
- Dr. T. C. Routley, Secretary.
- Dr. E. R. Secord, First Vice-President.
- Dr. J. H. Mullin, Past President.
- Dr. Edgar Brandon, Counsellor, District No. 9.

It was unanimously conceded at the close of the day that from the point of view of a pleasurable outing and an excellent programme, the occasion could not have been surpassed. Some slight idea of the interest manifested in the meeting may be gauged when it is pointed out that some of the practitioners travelled distances approximating five hundred miles to be present. To the committee in charge, Drs. Freeborn, Barber, McMurchy, Douglas and Brandon, heartiest congratulations are due.

A meeting of the Northumberland and Durham Medical Society was held in Cobourg on July 13th. Col. E. Stanley Ryerson of Toronto gave a very instructive paper on "Diagnostic Methods."

A meeting of the Northumberland and Durham Medical Society was held in Bowmanville on August 3rd. Dr. Herbert A. Bruce of Toronto gave an instructive address on the subject of "Acute Abdominal Diseases."

The Western Ontario Academy of Medicine has reorganized for the session of 1921-22 under the following Executive: President, Dr. F. W. Hughes; Vice-President, Dr. C. F. Harris; Treasurer, Dr. J. I. Ferguson; Secretary, Dr. Geo. A. Ramsay; Executive, Drs. George Hall, Fred. Campbell, E. L. Hodgins.

The autumn programme includes an opening session on "Tuberculosis," by Drs. Pratten, Moyle, Broome and Andrews at the Queen Alexandra Sanatorium, on Sept. 29th. During the week of Oct. 3rd will be given at the Sanatorium, a post-graduate course on "The Early Diagnosis of T. B.," which is open to practitioners on payment of a nominal fee. This course will occupy both morning and afternoon, and will include lectures, laboratory methods and clinical examinations. In addition to the Sanatorium staff, the following will contribute: Drs. McGregor, Hill, Crane, Williams and Fisher.

On Oct. 7th the first general meeting will be held in the New Medical College, London, when the programme will be of a neurological nature, and will be furnished by Dr. W. E. Dandy of Johns Hopkins Hospital, Dr. Chas.

Trew of Indianapolis and Dr. Russell McRobert of New York.

The November meeting will be held early in the month, and will be contemporaneous with the formal opening of the Medical College. The speakers on that occasion will be Dr. L. Barker of Johns Hopkins Hospital and Dr. Clifford Grulee of Chicago. The former will hold a medical clinic and the latter will present some phases of pediatrics.

On November 29th Dr. Bloodgood will deliver an address, and it is expected that Dr. George Armstrong will be associated with him on that occasion.

The seventh and final session of the Western Ontario Academy of Medicine was held on May 24th at 2 p.m. Papers were read by Dr. John B. Deaver of Philadelphia, and Dr. George B. Eusterman of the Mayo Clinic. Invitations had been extended to all visitors to inspect the new building, and the Medical Alumni of the University met during the day for reorganization and at night for a banquet. There was a most enthusiastic attendance, and the meetings throughout were characterized with the greatest enthusiasm.

The Perth and Oxford County Medical Societies met in conjunction at Lake View on June 29th. There was an excellent attendance at this charming but little known resort, in the heart of the Province. Dr. Cannon of Hamilton presented the subject of "Septic Abortion" in most acceptable form, an address which brought out excellent discussion from the experienced practitioners of the district. Dr. Gwyn of Toronto spoke on the subject of "Pernicious Anaemia and Its Treatment by Blood Transfusion," demonstrating specimens of anaemic blood and showing the agglutination reactions which may take place in bloods improperly grouped.

A meeting of the Northumberland and Durham Medical Society was held in Coborne, August 24th. Dr. W. T. Connell, Professor of Medicine, Queen's University, delivered a very instructive address on Sub-acute Endocarditis.

The society was fortunate in having with them Dr. F. J. Farley, President of the Ontario Medical Association. He favored them for a few minutes with a strong address on the work of the Association in the interests of the profession throughout the Province.

There was a very good attendance and a most enthusiastic meeting.

The Victoria County Medical Society was organized at a meeting in Lindsay on Friday, July 22nd. The President of the Ontario Medical Association, Dr. Farley; the Counselor of the District, Dr. McQuade of Trenton, and Dr. Routley, the Secretary of the Ontario Medical Association, all took part in the proceedings. Owing largely to their enthusiasm and the excellent words of advice of the President, a small but enthusiastic gathering of physicians quickly got together, formed themselves into an association with the following as officers: President, Dr. W. G. Collison, Lindsay; Secretary, Dr. F. Blanchard, Lindsay.

The meeting closed with an address by Dr. Gwyn of Toronto on "Heart Disease as Seen in General Practice," with some special notes on treatment.

A session of the Academy of Medicine of London, Ont., was held in the auditorium of the new Medical College building on April 25th, Dr. George McNeil presiding. The meeting was very largely attended by over two hundred physicians, an evidence, indeed, of the increasing interest which this medical society is stimulating among the practitioners of Western Ontario. Two excellent papers must be noted, one by Dr. W. T. Connell, Professor of Medicine, Queen's University, on the subject of "Sub-acute Bacterial Endocarditis"; the other by Dr. James T. Case of the Battle Creek Sanitarium, and of the Northwestern University Medical School of Chicago, on "The X-ray Aid in the Differential Diagnosis of Right Upper Quadrant Lesions." It is much to be regretted that these papers cannot be detailed in this column, but it is hoped they will appear in complete form in the Journal at some future date.

Book Reviews

Guide to Diseases of the Nose and Throat and Their Treatment. By Charles A. Parker, F.R.C.S., Edin., Consulting Surgeon to the Throat Hospital, Golden Square, W., and Lionel Colledge, M.B., F.R.C.S., Surgeon to the Ear and Throat Department, St. George's Hospital, S.W., and to the Throat Hospital, Golden Square, W. Second Edition. London, Edward Arnold, 1921.

The second edition of Parker's work on the nose and throat has now appeared and Mr. Lionel Colledge is associated with it.

Those who have had the opportunity and pleasure of reading the first edition will be gratified to know that the second edition follows closely along the lines of the former. The book is essentially written to assist general practitioners and students in becoming familiar with the diseases of the nose and throat.

The first edition consisted of 602 pages, but in this many portions of it have been entirely re-written, and it has been possible to omit many debatable points that occupied considerable space in the former edition. The book is well written and is a thoroughly reliable guide to the treatment of the diseases of which it deals. The illustrations are well chosen and special care seems to have been taken to carefully consider the disorders that one is likely to meet with in general practice. It may be recommended to students and practitioners as a work which embodies British practice of Rhinology and Laryngology, and when one follows this he will not be running after fads and his patients will have the best.

P. G. G.

Principles of Treatment. By Oliver T. Osborne, M.D., Prof. of Therapeutics, Yale University. 881 pages, 8 vo. Price, \$7.00. Philadelphia and London, W. B. Saunders Co., 1921.

This volume is an indication of the transition that therapeutics is undergoing. Only 343 pages are devoted to the consideration of the action of drugs, while over 400 pages are devoted to the consideration of endocrine glands and their principles, vaccines and sera, diet, mechanical and electrical treatments, the treatment of certain types of chronic poisoning by drugs or in industry, and of certain types of

emergency. A further chapter is devoted to certain common skin affections. The descriptions of the actions of the drugs with which the author deals are neither clear nor such as would be written by a pharmacologist of the newer school. The therapeutic advice is sound, a little dogmatic and evidently based largely on the author's own experience. There are some obvious errors, for example page 56, under beta-eucaine, we find the statement that "novocaine and procaine are the same as beta-eucaine." A useful feature which should appeal to the practitioner is the careful statements of the toxic actions of each drug discussed, whether due to overdosage or idiosyncrasy of the patient, with an indication of the treatment that should be employed.

V. E. H.

The Extra Pharmacopoeia. Vol. II., 17th edn. By W. H. Martindale, Ph.D., F.C.S., and W. W. Westcott, M.B., D.P.H. 688 pages, 5' cap, 8 vo. Price, 17/6. London, H. K. Lewis & Co., Ltd., 1921.

This book of pocket size, which is an addendum and supplement to the first volume, contains a wide diversity of material, much of which is not pertinent to a pharmacopoeia. The authors have really attempted in these two volumes to write an encyclopedia of pharmacy and medical chemistry. The practitioner may find it of value if used in this way, but the greater part of the book is quite valueless to him, for example, "Isotopes and Atomic Weights," "Indicators for use in Volumetric Analysis," "Physiological Effect in Comparison with Chemical Constitution of Synthetic Drugs," "Water Analysis." Even if he wanted instruction on these points he would find the instruction too brief and not sufficiently elementary to be of value. The long sections on radiology, radium and iontophoresis suffer in a similar manner. The authors' wealth of chemical information is apt to overwhelm all except those whose particular field enables them to understand to evaluate the detail presented. The work is, of course, of great value to the specialist in pharmacy. An interesting section gives some of the formulae of British quack medicines.

V. E. H.

Clinical Surgery by Case Histories. By Arthur E. Hertzler, M.D., Ph.D., F.A.C.S., Professor of Surgery in the University of Kansas. Two volumes, 1,106 pages, with 544 original illustrations. Price, \$18.00. Published by C. V. Mosby Co., St. Louis, 1921; Toronto, McAinsh & Co., Ltd.

In these volumes the author covers the field of clinical surgery from the standpoint of the case history, grouping his cases according to a typographic classification dependent upon the chief complaint. To this history is added the facts elicited on examination, the working diagnosis, the treatment, the pathology, the after course, and finally a comment on the case viewed retrospectively.

The whole work makes extremely interesting and instructive reading, and emphasizes the real value of an accurate history in making a diagnosis.

As is to be expected, cases of rather more than usual interest are predominant, and since this unusual interest was often dependent upon an error in diagnosis, or mistaken judgment as to treatment, the work is hardly to be considered as a text-book describing typical conditions. The author is particularly to be congratulated on the frank manner in which he has commented on errors in both diagnosis and treatment, since often one learns more from a full consideration of his own or others mistakes than from a series of normal cases. One cannot read these volumes without receiving a distinct stimulus to personal thought as to what the reader himself would have done under the conditions outlined. As a consequence, they will appeal especially to those who from past experience are able to compare the cases reported with those that they themselves have seen.

The treatment which has been carried out is usually based on sound surgical judgment, but one can hardly agree with the author that "crises in the lower abdomen are seldom immediately dangerous, and the indications for surgical operations are rarely absolute." He would also appear to be treading on dangerous ground when apparently favoring a waiting policy in certain cases of ruptured tubal pregnancy.

The work will well repay a careful and thoughtful perusal by anyone interested in the field of clinical surgery.

E. R. S.

Practical Chemical Analysis of Blood. Victor Carly Myers. C. V. Mosby Co., St. Louis. Price, \$3.00.

In this book the author has given those chemical analyses of blood which he considers of value in diagnosis. The methods given are chosen so as to give the simplest technique consistent with reliable results. Besides the description of the methods there are valuable discussions and tables bearing on the interpretation of the various findings. The extensive bibliography following each heading and the details for the preparation of the reagents required are added features.

In addition to the analysis of blood, there is a section devoted to some of the quantitative determinations on urine.

This book, by such a well-known worker as Dr. Myers, should be a valuable addition to the literature of laboratory methods.

P. J. M.

A Text-book of Pathology. By Alfred Stengel, M.D., Sc.D., Professor of Medicine, University of Pennsylvania, Physician to the Pennsylvania and to the University Hospitals, and Herbert Fox, M.D., Director of the Pepper Laboratory of Clinical Medicine, University of Pennsylvania, Pathologist to the Philadelphia Zoological Garden. Seventh Edition, reset, with 509 text illustrations, many in colors, and 15 colored plates. Philadelphia and London, W. B. Saunders & Co., 1921.

The Seventh Edition of Stengel's Text-book of Pathology follows the style of previous issues in that the subject matter is presented paragraphic reference form. The book is, according to the authors, "an attempt to give the practitioner and student a conservative defensible opinion of the subject as it is understood to-day." The work is divided into two parts dealing with general and special pathology. No specific references to the literature are included, but brief summaries of the results of various investigations are given.

Throughout all sections effort is made to correlate the problems of disease as studied at the bedside and in the laboratory, and in consequence the reader is made to appreciate the close inter-relationship of problems which are often not so dealt with. Many of the illustrations are excellent, the colored plates being especially good.

J. G. F.

Principles of Hygiene. The New Edition. A Practical Manual for Students, Physicians and Health Officers. By D. H. Bergey, M.D., Dd. P.H., Assistant Professor of Hygiene and Bacteriology, University of Pennsylvania. Seventh

edition, thoroughly revised. Octavo of 556 pages, illustrated. Philadelphia and London, W. B. Saunders Co., 1921.

This seventh edition of a well-known work is characterized by attention given to military and naval hygiene. The most striking feature from the academic standpoint is the inclusion in a book labelled as dealing with the principles of hygiene of a very great deal of sanitation. Thus under "air," quite 90 per cent. of the material given relates to the air, not to those who are to breathe it. The same might be said of the chapters on ventilation, on water, sewage and food.

The brief chapter on exercise is good, but the chapter on personal hygiene is barely four pages in length. Under industrial, school and military hygiene the same defect is found in that the surroundings are described in much detail (sanitation), but the reactions of the individual to those surroundings (hygiene) are little considered. Had this book been labelled sanitation rather than hygiene, its character would have been very much better described.

The chapter on "Vital Causes of Disease" is weak. The physician is directed to sleep at least eight hours a day while in attendance on infectious diseases in order to keep up his physical vigor, apparently as a prophylactic against contracting the disease under his care. No mention of immunity is made in this section, although the physician is warned against relying on the use of alcohol or drugs as protective agents!

One may consider this book as worth having for reference, on account of the accumulation of data it contains concerning a vast variety of interesting topics, from a list of tropical parasites to comments on metal armor worn by soldiers to protect against shell fragments; but as a systematic treatise on hygiene, it hardly meets the modern idea of hygiene, i.e., the cultivation of the body to meet the demands of its surroundings. Its chief lack is failure to indicate or discuss the application of the accumulated data to "the instant need of things."

H. W. H.

The Principles of Immunology. By Howard T. Karsner, M.D., Professor of Pathology, Western Reserve University, Cleveland, and Enrique E. Acker, Ph.D., Instructor in Immunology, Western Reserve University, Cleveland, J. B. Lippincott Co., publishers, Philadelphia and London. Canadian office, 201 Unity Bldg., Montreal. 309 pages, with 18 illustrations and 2 plates. Price, \$5.00.

This most recent work on the fundamental principles of immunity is, first of all, note-

worthy, in that it is one of the first (if not the first) books on the subject from which all and sundry diagrams of the side-chain hypothesis of Ehrlich have been omitted. Having made this courageous beginning, it is all the more curious that the work is marred by the retention of the Ehrlich side-chain nomenclature. Why use the word complement when alexin is meant and also the word amboceptor when immune body or anti-body is so much more in harmony with the views (notably those of Bordet) to which the authors seem to incline?

The book has avowedly been written for senior students of medicine and for practitioners engaged in work which precludes the possibility of their keeping abreast of modern progress in this field. On this account, as well as on others, it is to be regretted that dogmatic assertions are made for which there is no conclusive evidence available at present. For example, on page 56 appears the statement, "the advantage of the use of diphtheria toxin-antitoxin mixture is that a lasting immunity is established." That this is actually established is certainly not the case. Then, again, on page 57, in reference to the early symptoms of tetanus it is stated "in man the symptoms appear as a rule first in trismus of the jaw muscles." On the contrary, experience during the great war demonstrated conclusively that much more frequently pain and stiffness of the part into which the tetanus bacilli had gained entrance were the characteristics early symptoms, and these appeared before trismus. Physicians who neglect or do not observe these earlier symptoms and await the appearance of trismus will have lost valuable time in beginning treatment.

In regard to the question of sensitiveness to horse serum possessing antitoxic properties (as, for example, diphtheria antitoxin) in order to avoid reactions it is proposed that "if sensitiveness to horse serum is known it is suggested that antitoxin in some other animal, such as the goat may be employed, but sera of this sort are not easily obtainable in the market." This suggestion is entirely without merit, since no such antisera are anywhere obtainable. Why not instead propose desensitization with minute doses of horse serum?

The following rather incongruous statement appears on page 273: "The terms vaccine is derived from vaccinia or cowpox and the method of protective immunization against smallpox with vaccinia virus was called by Jenner vaccination. This great *empirical* work, etc." The bewildered reader who previously may have imagined that Jenner's immortal work could hardly be so described, is relieved later when on page 278 it is stated that "it remained for Jenner in 1796 to furnish scientific

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proof of the efficacy of vaccination with cow-pox," etc.

For the reader or student with a good working knowledge of the subject and a previous appreciation of the principles of immunity this book will probably be found to be of value; for others it has no advantages not possessed by several others, no more extensive, books already available in English.

Evidences of careless revision are to be seen on page 58, where Thiele appears several times as Teale, and on page 106 Tschistovitch appears more than once as Tschistovichs. Other similar errors occur elsewhere.

J. G. F.

A Text-book of Pathology. By William G. MacCallum, M.D., Professor of Pathology and Bacteriology, Johns Hopkins University. Second edition. Thoroughly revised. Octavo volume of 1,155 pages, with 575 illustrations. Philadelphia and London, W. B. Saunders Co., 1920. Cloth, \$11.00 net.

The excellence of MacCallum's treatment of the subject of pathology made it practically certain that this book would have a most favorable reception. Four reprints, including a second edition in four years, is tangible evidence of the character of its reception. The book is clear and lucidly written, and, as one would expect from a writer with the breadth of view of the author, contains much that is very illuminating from the standpoint of clinical medicine as well as that of pathology.

MacCallum in the preface to the first edition wrote: "A constant effort has been made to speak of the disturbances of function and of chemical interchange in the course of disease as far as that was possible and even to describe symptoms. If this makes the book seem like a treatise on clinical medicine it is only because pathology and clinical medicine are, after all, the same thing viewed from slightly different angles." This serves to explain much of the merit of the book and to make evident its value to physicians and medical students alike.

The new edition is a considerable amplification of the first. The sections on shock, acid-base equilibrium, hydrocephalus, immunity in tuberculosis, meningococcal infections, pneumonia after measles, influenza, cholera, leprosy, etc., have all been re-written. Parasitic diseases also come for more extended attention.

This is a scholarly book written by a man who has a thorough grasp of his subject, and has made most substantial contributions to the knowledge thereof. It can, of course, be most warmly recommended.

J. G. F.

The Basis of Psychiatry. Psychobiological Medicine for Students and Practitioners. By Albert C. Buckley, M.D. J. B. Lippincott Co.

This is one of the most modern books on psychiatry that has been published, and it is planned in a new and caretaking manner. Commencing with a description of the parallel development of the nervous system in different species and a comparison of the views on heredity, the author then passes to the development of the human brain and of the human mental development. Psychology of the brain is then taken up in a very full manner, concluding the first part of the volume.

The cause of nervous disease is well laid down, stress on the inborn tendencies rather than psychical strain being the base of the writer's views.

The chapter on symptomatology shows the author's predilection for psychological methods, while a careful chapter on laboratory work is fully taken up.

These chapters on psychology and preliminary studies take up half volume, and the remainder is given up to diseases, following the new classification of the American Association.

It is the best book for the student that has been placed in my hands and may be recommended without any doubt to the general physician.

G. H.

